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# USSR Report

TRANSPORTATION

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26 SEPTEMBER 1986

USSR REPORT  
TRANSPORTATION

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## CIVIL AVIATION

### INTERMINISTRY CONFERENCE ON IL-86 OPERATIONS, PROBLEMS

Moscow VOZDUSHNYY TRANSPORT in Russian 1 Jul 86 p 3

[Article by V. Tamarin, VODUSHNYY TRANSPORT special correspondent: "The Il-86: Operating Horizons-- Notes From the 8th Flying Technical Conference"]

[Text] The Il-86 aircraft transported 4.2 million passengers and 20,000 tons of mail and cargo in 1985. Il-86 flights were for 18 union and 35 foreign airlines. The operation of the aircraft on the Moscow-Norilsk-Moscow route has been begun. The Moscow-Krasnoyarsk-Khabarovsk technical flight has been carried out. Intensive preparations are taking place for the operation of the Il-86 in Yerevan. Tests of the aircraft have been conducted at Yakutsk Airport with an outside temperature of  $-40^{\circ}$ . The designers and aviators on the problems in operating the aircraft and ways to solve them.

The wide-bodied beauty -- the giant Il-86 -- long ago became the pride of Aeroflot and its flagship. And rightfully so: It is a dependable, economical and high-speed winged machine. Passengers love it, and yes, some consider it a stroke of luck to fly on it.

Today, Il-86 routes go to practically all ends of our country: to the Far East, the Far North, the Caucasus, Central Asia, Siberia, and Leningrad. The exposure of the aircraft on international airlines is broad. This geographical distribution will expand with each passing year.

This means that shipping volumes will grow and the aircraft pool will increase. That is why it is so important to catch the peculiarities and trends in its operation and to sum up the experience in using it and to do this in a timely fashion. The flying and technical conferences, which the Ministry of Civil Aviation regularly conducts with the Ministry of the Radio Industry, Ministry of the Aviation Industry, Ministry of the Communications Equipment Industry, and other interested departments and organizations, have been called upon to serve this purpose.

These ministries were authoritatively represented at the 8th Flying Technical Conference which was recently held at Vnukovo; specialists from the Ministry

of Civil Aviation, Aeroflot's territorial administrations which operate the Il-86 aircraft, and civil aviation airplane repair plants and scientists from the State Scientific Research Institute for Civil Aviation represented our branch.

V. Gorlov, deputy minister for civil aviation, opened and conducted the conference. He summed up the results of the five-year operation of the Il-86 and discussed the prospects for its development.

V. Gorlov emphasized: "The distinctive feature of this conference is that it is taking place for the first time after the April 1985 CPSU Central Committee Plenum and the 27th Party Congress which placed before workers in the transport branches the task of satisfying in every way possible the needs of the national economy for transport services. The widespread introduction and effective use of the Il-86 in the country's transport infrastructure will be one of the solutions to this task."

The flight hours for one Il-86 aircraft increased in 1985 by eight percent when compared with 1984. This is, of course, an increase. It occurred by strengthening the material and technical base of the enterprises operating the Il-86 and by increasing the number of specialists, who had been retrained to service this type of aircraft, by 500 people.

Nevertheless, such positive qualities of the Il-86 as high productivity of flights and low specific expenditure of fuel require a more intensive use of the existing pool. As is known, intensiveness is determined by the level of serviceability. The operators have nothing to brag about in this: With a norm of 65 percent, the serviceability of the Il-86 park was 57.6 percent in 1985 and 55.5 percent in 1986.

Quite a few explanations and reasons for the phenomenon were cited during the conference. At first glance, each of them "had a right to exist", as they say. Among others, P. Ivanov, the deputy chief of the Ministry of Civil Aviation Operations and Repair of Aviation Technical Equipment Main Administration, mentioned the not quite satisfactory attitude of the Ministry of the Aviation Industry toward supplying spare engines, assemblies, units, and equipment. Unfortunately, the ties between the manufacturers of the Il-86 and its operators have not been truly strengthened and have not found a solid foundation for the building of business-like cooperation.

Because of this, the revision of programs, which can only be performed under plant conditions, is being dragged out.

The effect of contracts for post-guarantee servicing is still low, and several aviation enterprises have even been compelled to reject them in view of this. Indeed, was it really the procedure that the specialists in the Vnukovo Aviation Technical Base had to move engines from plane to plane 28 times in 1985, spending 4,000 norm hours on this?

One can understand the resentment of the Vnukovo people the more so since almost all of those who spoke unanimously pointed out the initial cause: an insufficient

supply of spare engines. A representative of the engine specialists' design bureau -- regarding the situation that had taken shape with understanding -- promised definite action. But as yet....

It is still necessary to achieve the highest Il-86 flight productivity using existing resources and the serviceable pool. The branch scientific establishment has been called upon for help in this matter.

A. Subbotin, the chief of the State Scientific Research Institute for Civil Aviation, said: "To know how means to learn and to constantly improve one's skill. We are helping the operators in this."

A. Subbotin mentioned a number of works by the institute's scientists which are connected with improving the flight and technical characteristics of the Il-86 aircraft. Thus, tests of the Il-86 were conducted jointly with the Testing and Design Bureau imeni Ilyushin during February 1986 in Yarkutsk with the outside temperature -40°. They showed that the aircraft's systems and equipment correspond to the norm for airworthiness. The results have been analyzed and put into a document. They have found practical application during the operation of the Il-86 in Norilsk.

In order to increase the regularity of flights, NETs and AUVD [expansions unknown] in the State Scientific Research Institute for Civil Aviation developed changes in the Flight Operation Manual in the section on lowering minimums for landings and takeoffs under International Civil Aviation Organization Category II. The go-round procedure under manual and automatic conditions has been brought into uniformity.

Flight personnel pointed out the braking system's sometimes insufficient effectiveness on runways covered with precipitation during operations. The scientists of the State Scientific Research Institute for Civil Aviation and plant specialists modified the braking unit, tested it during February at a plant flight test station, and are now revising the system.

Among other topics of scientific research, it is possible to mention the idea of building single-crystal turbine blades, increasing the life of the aircraft, etc. Work is continuing in all directions, and judging from the reaction of the test and design bureau representatives, they are viewing the obtained information with approval.

Any conference is an exchange of experience. It is a distinctive approval of ideas and proposals. If its tone is passionate, arguments will arise and -- possibly -- discussions also because like-minded persons and brothers-in-arms in a great state task have come together. There were controversial judgments and argued criticism during this conference.

The interest, which the participants in the eighth conference displayed toward the report of the directors of the Kazakh Administration technical services and the Tashkent Aviation Technical Base who discussed their work to increase serviceability and decrease idle time during maintenance, is understandable.



This experience was valuable for the representatives of all 11 administrations -- both for those who had been operating the Il-86 for a long time and for those who were beginning to receive it for service.

The attention, with which the flight and navigational personnel listened to their colleagues from the TsUMVS and MTU [expansions unknown] who expressed a desire to improve Il-86 operations, is also understandable.

G. Novozhilov, general designer of aircraft, said: "I also listened to the presentations of the conference participants with enormous interest and satisfaction. You see, the slogan of our test and design bureau is 'Do not disregard a single plane with the designation Il.' Having heard several critical comments addressed to us, I came to the conclusion that the work of the representatives of the test and design bureau and the Ministry of the Aviation Industry at the base airports for the Il-86 airplane must be intensified."

From the point of view of the general designer, the Il-86 operating conditions were more complicated than they supposed in the test and design bureau. He thinks that even five years of experience does not attune aviators to the more mobile preparation of the new airports where the receipt of Il-86 is planned. The geographic distribution of the flights is expanding slowly because of this, and there, where it is being used, the utilization coefficient is still low (according to test and design bureau data): from 20 percent (Alma-Ata) to 40 percent (Tashkent).

It is difficult to take exception to G. Novozhilov in this. No matter how sad, they compile Il-86 flight schedules according to the serviceability of the pool (naturally, this is correct), but they hurry to adjust serviceability for the schedule (undoubtedly, this is fallacious and even fraught with serious consequences). You see, there is a chance to increase the flying time of an aircraft 2 - 2.5-fold by insuring its good maintenance, according to the statements of the speakers.

One of the ways to do this is the widespread (and not amateurish) introduction of Analiz-86 aircraft maintenance systems. More than a year has passed since a decision was made in this connection, and the introduction of the system is in the initial stages in that same Tashkent.

Even at Vnukovo there is an opportunity to decrease the time for inspecting an aircraft almost fourfold. As those designers who are familiar with the Vnukovo Aviation Technical Base maintain, the ground equipment resources here are simply not in the best of condition. Indeed, the capital's airport does not have a hangar for this airplane. You see, if one looks into the not too distant future, the Il-96-300, which is literally filled with electronics, will arrive in civil aviation -- and one must think about this now because you will not manage without a hangar then.

Perhaps the enigma in the evolution of the serviceability percentage -- in the summer it increases to 70 percent and in the winter it falls to 30 percent -- lies in this: the unsuitability of our technical services to the prescribed

maintenance conditions? However, this trend is difficult to detect in different administrations. For example, how can one explain the fact that it is kept at the level of 52 percent in the Uzbek administration of Civil Aviation in any weather?

The Il-86 is a powerful and economical transportation system. One knows the ardent attention with which the leadership of the branch has treated the operation of this aircraft. It is understandable: Based on many parameters, the aircraft is equal to world standards and, according to some of them, it is a pioneer vehicle.

For example, wishing to insure maximum comfort for passengers, the Ministry of Civil Aviation asked the designers to incorporate the "Carry-on passenger baggage" principle in the operation of the aircraft. The desire was fulfilled. A built-in ladder, a baggage compartment on the "first floor" -- all of this was a priority before other foreign airplane building firms. The innovation was patented and rocked the world.

Except for Mineralnyye Vody, passengers pass through the usual check-in procedures and hand over their luggage, during which suitcases are broken as before, complaints are received and -- at the same time -- the standing around in transit airports has been lengthened from one and a half hours to two hours. The low utilization factor comes from this.

During the conference, they cited another example of our inability to organize: The schedule is inflexible for an aircraft, especially during the winter. Instead of permitting one Il-86, they plan two Tu-154's. We lose that which we have and that which has been piled into the design of the aircraft. Moreover, foreign experience, where there are approximately 1,500 wide-bodied airplanes operating, convinces us of the advisability of these combinations.

... The conference was conducted in accordance with the 1986 plan for measures. In accordance with it, the plan of measures to improve the operation of the Il-86 aircraft will be summed up and submitted for approval on a monthly basis. I would like to hope that the majority of questions, which were posed in May 1986, will be resolved by the 11th conference. The constructive and business-like atmosphere, which permeated all of the work of the last conference, inspires this hope.

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CIVIL AVIATION

BRIEFS

V-3 HELICOPTER TESTING CONTINUES--Moscow--Tests of the multi-purpose V-3 helicopter, which was jointly designed by Polish and Soviet scientists, are taking place under very different conditions -- the high mountains and hot climate of Tajikistan, the strong winds of Baku and the severe winter of Yakutsk. Specialists from the State Scientific Research Institute for Civil Aviation, who have provided many valuable recommendations for improving the new machine, have participated in all stages of the testing. This has permitted research time to be shortened and the time for introducing the new helicopter, which is intended for transporting cargo (within the aircraft and suspended externally) and moving watches for drilling and medical purposes, to be brought closer. [By V. Lokhin, VOZDUSHNYY TRANSPORT correspondent] [Text] [Moscow VOZDUSHNYY TRANSPORT in Russian 28 Jun 86 p 3] 8802

Tu-154B SLIPPERY RUNWAY TESTING --Moscow -- "Research On The Take-Off and Landing Characteristics of the Tu-154B Aircraft On Runways With a Reduced Adhesion Coefficient" -- such is the title of a new work by specialists in our branch's leading institute. Testing has permitted the utilization efficiency of this wide well-known airliner to be raised, in particular, not limiting the aircraft's landing weight on a runway with a length of 2,500 meters. The directors of the Borispolskiy Aviation Enterprise provided a great deal of help to the scientists, having provided them with everything necessary for the successful conducting of the experiment. Preparations are now taking place for the publication of supplements to the RLE [expansion unknown]. [By V. Lokhin, VOZDUSHNYY TRANSPORT correspondent] [Text] [Moscow VOZDUSHNYY TRANSPORT in Russian 28 Jun 86 p 3] 8802

AIR CUSHION AIRPORT TRANSPORTER-- Moscow -- The employees of the Aeroprojekt State Design Investigation and Scientific Research Institute for Civil Aviation and their colleagues from GipronIIAviaprom [All-Union State Research and Development Institute for the Aviation Industry] are working on a design using an air cushion, which is intended for transport and loading and unloading operations using containers and pallets. It is mounted on so-called aerostatic supports. This allows friction during the movement of goods to be considerably reduced and, thereby, energy expenditures during transport operations to be substantially decreased. The decrease in the friction coefficient will lead to cargo being moved over the surface without any special effort. The experimental device, which has been built, will begin to undergo testing in practice this year -- at one of the Civil Aviation airports. [By V. Lokhin, VOZDUSHNYY TRANSPORT correspondent] [Text] [Moscow VOZDUSHNYY TRANSPORT in Russian 28 Jun 86 p 3] 8802

IL-86 YEREVAN SERVICE BEGINS-- An IL-86 airbus, which had delivered passengers from Moscow, has completed a landing at the Zvartnots Airport for the first time. While preparing to meet the airliner, the Aviaremstroy [Aviation Repair and Construction] Trust was able to prepare a runway, which was new to them, within a compressed time, and, meanwhile flight crews from the Armenian Administration of Civil Aviation attended a retraining course in Moscow and Ulyanovsk and mastered the art of flying the airbus. Before long, the IL-86 will connect Yerevan with the country's other cities. [By S. Bablunyan, IZVESTIYA special correspondent] [Text] [Moscow IZVESTIYA in Russian 7 Jul 86 p 2] 8302

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## MOTOR VEHICLES AND HIGHWAYS

### FEATURES, PERFORMANCE OF TMZ-5.951 OFF-ROAD MOTORCYCLE

Moscow ZA RULEM in Russian No 5, May 86 pp 8-9

[Article by V. Pudoveyev, chief designer and the ZA RULEM science and engineering department: "The 'Tula' All-Terrain Motorcycle"]

Our readers have already had an opportunity to find out about the development of the "Tula" TMZ-5.951 special-purpose motorcycle, with its improved all-terrain capabilities in this magazine (No 7 and No 11, 1985). Having manufactured a test lot of these motorcycles in order to gain some operational experience the Tula Machine-Building Plant imeni V. M. Ryabikov has now initiated series production of this vehicle. Plans call for the manufacture of 5,000 of these bikes this year. We want to familiarize ourselves with this model, which embodies a radical departure, both with regard to its design and to the methods of its preparation and manufacture, which is also not done in an altogether orthodox way. And so we gave the floor to the designer, one of its creators, as well as to the customers, and added a commentary from the editorial board as well.

### THE DESIGNER'S OPINION

The imeni V. M. Ryabikov plant manufactured motor scooters for many years. The excellent demand for the "Ant" freight-carrying model once again showed us that the rural purchasers held the key to steady profits for our motorcycle technology. This prompted us to get busy developing a machine designed primarily for riding on dirt roads as well as off-road. As a result, our conveyor no longer carried motor scooters, but motorcycles, and besides that among our domestic models there are none like this one. For the first time we have a motorcycle which uses a motor with a forced-air cooling system, an electric start feature and wheels with wide-profile tires.

We have modernized the famous "Tulitsy" motor for this bike, having equipped it with an uncomplicated but extremely efficient device--a lobed valve on the intake, which prevents blow-out of the unburned fuel mixture during by-pass. This helped to not only reduce fuel consumption (by about 0.4 liters per 100 km), but also helped to make the engine characteristics more acceptable for our rural roads. The torque has been increased, and the revolutions at

which it is attained have been shifted into a more moderate zone. In short, the motorcycle has been provided with better adaptability to load shifts. We should also mention that the engine operates on a mixture the oil portion of which has been reduced (1:33 after the engine has been broken in).

The motors's steady operation at low and medium revs is enhanced by the massive flywheel, the role of which is played by the electric dynastarter. And the forced cooling of the cylinder and head keeps the engine from overheating and losing power during extended low-speed riding.

The running gear must also be suitable for difficult riding conditions. The duplex frame (which is made of two separated branches) possesses high rigidity for torsion, thanks to which the bike's controllability is appreciably improved. By using small-diameter wheels we were able to lower the center of mass so as to improve the bike's stability. And in themselves the wide profile tires exert little unit pressure on the ground, provide better road grip, do an excellent job of softening shocks from smaller rough places and, something which is of no little importance, do not disturb the soil. The front fork and the shock absorbers on the rear suspension have been adapted from the Voskhod motorcycle.

The bike is equipped with a 12-volt electrical system, an electric start, allowing the bike to be started with the turn of a key. A convenience such as this has set our motor scooters apart, and is seen here on our domestic motorcycles for the first time. Needless to say, the bike is also equipped with a kick starter. The lights, instrumentation and switches have been standardized with those used on other machines. Specifically, the instrument panel is the same as that used on IZh [Izhevsk Motor Works] motorcycles.

Although the bike is primarily designed for off-road use, it is equipped with all the generally accepted safety elements--from the two rearview mirrors to the turn indicators and the cat's eyes. The front fork is equipped with an antitheft lock.

Naturally we admit that our motorcycle is not yet a total success, as it is still in need of several technical solutions. A number of the electrical instruments, including even the power generator, are rather heavy. Ideally, the motorcycle should be lightened by some 15 kg. But in order to accomplish this it would take not only our efforts, but those of our subcontractors.

So these are the main features of our TMZ-5.951 motorcycle, with its improved all-terrain capabilities. This is the first model in the country in this class. And of course we are anxiously awaiting its reception by the customers.

#### A CUSTOMER'S OPINION

So what if, when our motorcycle plants have to quickly speed up the renovation of their output and improve quality, the customers' reaction worries the plant? The new Zenit company store has been giving presentations of this bike for some time now: during the first month of the store's operation (let me mention that this is January, the middle of winter, and what's more the store's in

Moscow) about 30 Tula motorcycles were sold, with only one or two other well-known models being sold. There was always a crowd around the stand with the new bike. A lot of differing opinions were expressed, but no one remained indifferent. For example, the Tula model drew the attention of D. Kuznetsov who came from the city of Novoaltaysk, in the Altay Kray. He is a technical engineer and all his free time is devoted to motorcycle touring.

"This is very likely the first domestically produced motorcycle adapted for touring," he says. "People who go fishing, go into the forest, and do things without taking along a lot of baggage are interested in this bike. Sure, a few things need to be worked out, but the basics are there!"

Naturally, the customers compare the new machine's capabilities, the special features of its design with its price (R680). The buyers and people visiting the store, all those who looked at the bike with these points of view recognized that it was totally acceptable.

According to the evaluation of former motorcyclist S. Amelin from Tula, who sent the editorial board a letter, his emotions prevailed: "I have seen this motorcycle on the roads of the Tula Oblast, and I experienced nothing short of delight."

Is this merely local patriotism? Free of that, our staff workers tried to evaluate this bike in a more fault-finding manner.

#### OUR STAFF'S OPINION

After the first impression ("it's not like all the rest") one has a natural desire to understand how indeed it is unlike the others. This question can be answered thus: the sum total of its appearance, the integrity of its parts, the manifest unity of the designer's thoughts into a rather harmonic whole. This gives the sensation of compactness, concealing the dimensions; the motorcycle seems small though in fact it is no shorter than the Voskhod. There are almost no random, capriciously "added on" elements. Almost none, but some there are. If the standard headlight is made part of the rear panelboard, then the headlight and the instrument panel, in our opinion, are a little large. The reliable but old-fashioned relay has not been completely concealed in the place assigned to it; the terminals and wire connections protrude, and this elicits a comfortless suggestion: what about the way water and mud splash onto the bike? This doesn't occur to you, looking at the multicolored bundle of wires beneath the light: they ought to be better protected.

We have to register a complaint about the absence of the small fairing which was on the experimental models. In hiding certain parts which are unfortunate in appearance this gives the motorcycle an unfinished look.

But there is much about the bike which is attractive. The saddle seat and side panels are easy to remove, and then, as seen in the photo [photo not shown], the motorcycle is totally accessible for maintenance and repairs. It is gratifying that such large parts as the saddle base, the fenders and the air filter housing are finally being made of plastic. We hope that in time the list of these parts will be expanded, for this will help the cycle to "lose weight".



For objectivity's sake we would like to mention that a better engineering solution could apparently be found to strengthen the saddle seat and the fenders, which are made more worthless as the ends of the fenders abrade the paint on the sides. We believe that these small details will be eliminated. We won't repeat the designer's opinions. The data he presented should, in our opinion, draw the attention of the rural motorcyclists for whom the machine was designed.

We will say only, in summation, that on the whole the Tula designers' venture shows the extent to which it is possible, taking into account the series-produced and the original bikes, to come up with a machine with altogether new qualities. We hope that we will be given the opportunity to evaluate them in greater depth.

In placing great significance on the debut of this motorcycle designed especially for our rural areas, we ask this favor of its owners: when the speedometers of your bikes reach 1,000 km, find time to share with our editorial staff, and with thousands of motorcyclists as well, your impressions. We are quite sure that this will be of great benefit to them.

The TMZ-5.951 All-Terrain Motorcycle



The TMZ-5.951 Motorcycle: Technical Data:

General information: dry weight--129 kg; maximum load--170 kg; top speed--85 km/hour; stopping distance from 30 km/hour--no more than 6.5 m, from 60 km/hour--no more than 25 m; monitored fuel consumption using intake valve--3.6 liters per 100 km, with no intake valve--4.0 liters per 100 km; fuel capacity--11 liters, reserve fuel capacity--0.5 liters.



Engine: type--two-stroke, forced-air cooled; number of cylinders--1; displacement--199 cm; compression ratio--8.5; horsepower--12.5/9.2 kw at 5,300-5,800 rpm; maximum torque--1.8 kg-forces·m at 4,900-5,500 rpm; carburetor--K-62; fuel--mixture of A-76 gasoline with oil (33:1).

Electrical equipment: rated voltage--12 v; storage battery--3MTR10 (2 cell); electric starter--DS1B; capacity--87.5 volt; voltage regulator--RR-121 or RR-121A; turn indicator relays--RS57V or RS491; headlight unit--FG137V or FG140-200B; spark plug--A17V.

Transmission: clutch--multi-disc, oil bath; gear-box--four-speed (1st gear--3,000 rpm; 2nd gear--1,644 rpm; 3rd gear--1,235 rpm; 4th gear--0.900 rpm); motor drive--chain (2.714).

Running Gear: frame--tubular, welded, duplex; front fork--telescoping, hydraulic damping; rear suspension--swing type, hydraulic damping; front wheel travel--130 mm, rear wheel travel--80 mm; wheels--stamped disc, with interchangeable aluminum hubs; shock absorber diameter--150 mm; tires--6.70-10; front tire air pressure, with no passenger--1.0 kg-force/cm<sup>2</sup>, rear tire--1.5 kg-force/cm<sup>2</sup>, with passenger--1.2 kg-force/cm<sup>2</sup> and 2.0 kg-force/cm<sup>2</sup>, respectively.

Price--680 rubles.

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## MOTOR VEHICLES AND HIGHWAYS

### IMPROVED MOTOR VEHICLE HARVEST SUPPORT URGED

Moscow AVTOMOBILNYY TRANSPORT in Russian No 7, Jul 86 pp 1-2

[Unattributed article: "Improving Crop Harvesting Operations"]

[Text] The time has come for the mass harvesting of crops, which occurs in the period from July to November across the whole Russian territory. The harvesting and procurement of crops is a serious examination not only for the rural laborers, but for the truckers as well.

In his report at the 27th CPSU Congress, CPSU Central Committee General Secretary M. S. Gorbachev emphasized once again the especial importance of the timely and high-quality conduct of agricultural operations and noted that a substantial source for replenishment of the food fund is a reduction in the losses of the products of the fields and farms in harvesting, transportation, storage and processing. The reserves here are great: the addition to consumer resources could total up to 20 percent, and up to 30 percent for certain types of products.

It is impossible to overestimate the role of truck transport, which is the most important connecting link in the harvesting--transportation--procurement conveyor, in resolving this task. The uninterrupted operation of harvest equipment and the timely dispatch and procurement of agricultural products, as well as the preservation of the cultivated crops, depends to a considerable extent on the level of organization of the shipping of agricultural products. The truckers should not only deliver the crops where they are needed in a timely fashion and without losses--to state receiving stations, the threshing floors and warehouses of kolkhozes and sovkhoses, processing enterprises, the trade network and public catering establishments, transshipment points of transportation centers etc.--but also do this with the lowest transportation expenses possible.

How can the results of our work be evaluated from this point of view?

More than 600,000-700,000 trucks are employed each year in the crops harvesting period in the Russian Federation for the shipping of agricultural products, and it is very important to ensure their efficient and precise management. The RSFSR Minavtotrans [Ministry of Motor Transport] and its subdivisions in the localities have tried many different forms of organization

for the management of trucking in the harvesting of crops, at the basis of which is the principle of the centralization of shipping and the creation of unified management organs in the regions for all truck transport employed in the harvest, regardless of its departmental affiliation. The most efficient of these, however, is the method developed by the Saratovavtotrans [Saratov Truck Transport] Territorial Association for the centralized management of harvesting--transport--procurement operations.

The essence of this method of crop harvesting operations is well known not only to the trucking employees, but to those of related transport industries as well. Much material has been published on it, including in the journal AVTOMOBIL'NYY TRANSPORT. The RSFSR Council of Ministers and the ministry have repeatedly organized conference-seminars for the study of this method (in the cities of Saratov, Penza, Orenburg, Krasnoyarsk and Omsk) to which, along with the employees of the territorial trucking associations, were invited the managers of local ispolkoms and the administrations of interested ministries from all of the principal agricultural oblasts, krays and autonomous republics.

I would just like to emphasize that the employment of this method makes it possible to organize the everyday precise planning and management of trucking and the rhythmic execution of shipping crops from the harvest combines to the receiving stations. With this system of management, all of the participants in the harvesting, shipping and procurement of agricultural products work in a concerted manner according to a unified plan. As a result, the productivity of the truckers is increased, idle time of harvesting machinery due to the lack of transport equipment is eliminated or reduced to a minimum, the time periods for procurement of agricultural products and consequently their losses are reduced, the throughput capacity of elevators is increased, and a reduction in transportation expenses is achieved along with an economy of labor resources and fuels and lubricants. The most important thing, however, is that all of this is achieved without any major material expenditures. All that is required is initiative on the part of the truckers and coordinated preparatory work by all interested departments that participate in the harvesting, shipping and procurement of crop products.

What results were achieved with the incorporation of the Saratov and other progressive methods for trucking operations in the harvesting of crops last year?

Through an increase in trucking productivity alone, the volume of shipping of agricultural products increased 9.4 percent overall for the Russian Federation in the face of a reduction in the number of trucks employed in harvesting. The centralized method of managing the harvesting--transport--procurement process, according to the reports of the territorial associations, was incorporated in 749 rayons of 42 oblasts, krays and autonomous republics, which is 10 percent higher than the 1984 level. The team contract, very efficient in crop shipping, was more widely disseminated (compared to 1984). Last year, a total of 5,600 driver teams, uniting 65,000 drivers, operated under contract and shipped 68 million tons of agricultural products (14 percent more than in 1984).

The most efficient method of centralized management of agricultural-products shipping and the team contract was employed in Krasnodar and Stavropol krais, the Bashkir ASSR and Orenburg, Volgograd, Lipetsk, Tambov, Tula, Kuybyshev and several other oblasts, where the trucking operated with high productivity regardless of the situation taking shape in the harvest. In Orenburg Oblast, for example, the productivity of trucking increased 48 percent compared to 1984, and the same amount of truckers shipped an additional 9 million tons of agricultural products, through the application of the method of centralized shipping management in 35 rayons and the participation of 960 contract teams. In Tambov Oblast, the shipping of agricultural products increased by 4.2 million tons in the face of a reduction of 3,400 in the number of trucks employed through an increase of 24 percent in truck productivity. Analogous results were achieved in the other enumerated oblasts, krais and autonomous republics as well.

It must be noted, however, that there are serious shortcomings in organizing the productive use of trucking and the incorporation of the team contract and other progressive forms of improving the harvesting--transport--procurement conveyor that are concealed by these favorable numbers.

The task of ensuring the application of the centralized management of agricultural shipping according to the experience of Saratov Oblast in all principal grain and sugar-beet regions of the Russian Federation before 1985 is before the federation. The fulfillment of this task is still far off, however. Notwithstanding the clear advantages of this method and the repeated holding of conference-seminars, the local organizations and truckers of Kalinin, Kostroma, Moscow, Pskov, Ryazan, Smolensk, Ulyanovsk, Amur, Kirov, Irkutsk, Sverdlovsk, Chita, Tomsk and Perm oblasts and the Kalmyk, Dagestan, Kabardino-Balkar and Chechen-Ingush autonomous republics have still not restructured their operations and are implementing the centralized management of agricultural shipping in one or two rayons or are not employing it at all. The situation in these oblasts is analogous with regard to organizing the operations of driver teams under contracts, which teams still transport less than 10 percent of all agricultural products.

In some oblasts (Voronezh, Novosibirsk and others), the issue of organizing the operation of agricultural-products shipping management centers [TsUP] is approached in a formalistic manner. These centers are not completely staffed and their employees carry out only the collection of statistical material during the harvest. In this regard, the TsUPs are not having an appreciable effect on improving the organization of trucking utilization in harvesting. Thus, in the Tatar ASSR, where according to reports the centralized method of agricultural shipping management was incorporated in 30 rayons in 1984 and all 38 rayons of the republic in 1985, the daily output per truck employed did not exceed 14 tons, that is, was lower than the average level for the republic. In Novosibirsk Oblast, reporting the incorporation of this method in 20 rayons last year, productivity did not increase and totaled 12.6 tons a day.

Such an attitude toward the incorporation of the system of centralized management for agricultural shipping and the substitution of the functions of the TsUP dispatcher functions with the activity of various staffs frequently leads to the creation of an artificial transportation shortage on the farms in



the face of an adequate supply of transportation equipment for harvesting operations in the oblast overall. Moreover, the government had to send an additional number of trucks to several of the enumerated oblasts during the harvest from other rayons of the republic at the urgent request of the oblast ispolkoms.

The losses borne by the state due to the shuffling of trucks between oblasts are enormous. The conclusion, therefore, is obvious--they should be reduced to a minimum through the realization of measures for raising the utilization efficiency of local trucking.

The centralized management method of operations in the harvesting period is not only a high level of management and coordination in trucking operations in the delivery of agricultural products to procurement points. The major portion of trucks employed in the harvest (up to 70 percent) are occupied with shipping products from harvesting combines, that is, are working in the fields. It is very important to organize the precise operation of these trucks, since the course of crops harvesting depends greatly on this. The principal task is entrusted to the dispatching points, which should be set up right on the farms and operationally subordinated to the shipping management centers. It is extremely important to train people to work at these points and teach them to manage transport competently.

The number of dispatching points created at kolkhozes and sovkhoses during the harvest is increasing constantly and exceeded 18,200 last year. Their work in managing truck transport in and of itself, however, is frequently organized poorly. With the creation of transport services for the agro-industrial complex in the localities, the situation should be altered sharply and the formation, preparation and training of the personnel of the dispatching points on the farms, and the main thing--the quality of their work--should improve considerably.

Such important reserves for raising the productivity of transportation equipment in crops harvesting as truck trailers are still insufficiently utilized. In many oblasts (krays and autonomous republics) the sphere of their application is limited to the delivery of grains and sugar-beets to receiving stations. As a rule, the trucking clients do not consider trailers to be a transport unit and avoid using them, especially in farm shipping. Many cases are known when the truck trains arriving for harvesting are broken down: the trailers are unhitched from the trucks and not used. That is what happened last year in harvesting in the Krasnoyarsk, Krasnodar and Altay krays, the Tatar ASSR and the Amur, Astrakhan and several other oblasts, where trucks were sent from other oblasts.

The impending harvesting, shipping and procurement of agricultural products should be conducted in an organized fashion in a condensed time period. Intensive targets have been established for all territorial trucking associations for preparing the truck fleet before the beginning of harvesting operations, the incorporation of the centralized agricultural-products shipping management method in all principal agricultural rayons, and the considerable increase of the amount of agricultural-products shipping by contract teams. The fulfillment of these targets with the organization of

mass socialist competition among the collectives of associations, trucking enterprises, teams and individual drivers and the use of a universal precise system of trucking management should ensure not only the uninterrupted operation of equipment and the shipment of all the crops cultivated by the rural laborers in optimal time periods, but also the high productivity of trucks with minimal expenses for the state. This will be the worthy contribution of the truckers to the fulfillment of the Food Program.

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## MOTOR VEHICLES AND HIGHWAYS

### BRIEFS

ABAKAN RIVER BRIDGE CONSTRUCTION--Krasnoyarsk Kray--Construction has begun on the new mulitspan highway bridge over the Abakan River near the center of the Khakass Autonomous Oblast. The presently used bridge is already incapable of handling its freight and passenger vehicle traffic. The new crossway, designed by Lengiprotrans [Leningrad State Institute for Transport Planning] specialists, who developed the project, is to be built some five km upriver. It is estimated that with the opening of this bridge, the city's main motor vehicle traffic flow, which now goes through the downtown area, will be greatly relieved. The effect of this will not only be economic, but ecological as well. The new bridge comprises only a part of an entire complex of structures to be erected by Abakan Bridge-Building Collective No 91 on the shores of this Siberian river. [By A. Shcherbakov, IZVESTIYA staff correspondent] [Text] [Moscow IZVESTIYA in Russian 23 Jun 86 p 2] 12659

## RAIL SYSTEMS

### BAKU METRO SYSTEM CONSTRUCTION ADVANCES

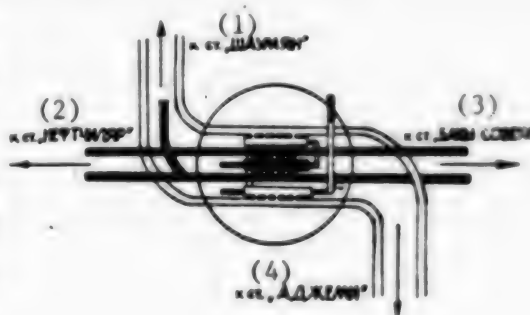
Baku VYSHKA in Russian 4 Jun 86 p 3

[Article by A. Gamedov: "The Subway's Third Phase Is Being Built"]

[Text] The regular movement of trains began in January on the lines of the second phase of the Baku metro system. How do things stand with the construction of the new lines?

Their construction has been spread to the eastern part of the city. It is clear in the diagram how the builders of the line from the Neftchilyar Station are rushing to the south: They must cross thickly settled housing tracts and envelop the population of the Kilometer-8 Settlement and Akhmedlov more fully with the most convenient type of passenger transport.

This section, which has been called the eastern one, is a component part of the third phase in the construction of the metro system. M. Bagirli, the chief engineer for the board of directors for the subway system being built, and A. Ragimov, the deputy chief engineer of the Baktonnelstroy [Baku Tunnel Construction] administration, discuss it.



#### Key:

1. To Shaumyan Station
2. To Neftchilyar Station
3. To Baky Soveti Station
4. To Adzhemi Station

The length of the lines in the eastern part of the subway system is 4.56 kilometers with three stations of a small contour interval, that is, they are being built using the method of digging the foundation pits from the surface of the ground. This provides an opportunity to lower their costs by 1.5-fold-twofold.

In contrast to the stations on the metro's first section, they are two meters wider like the second phase stations. This provides a great deal of convenience for passengers. The platform length is designed to receive five-car trains as is done on all of the country's subway systems, except for the Moscow one where trains consisting of eight cars and the Leningrad system where trains consisting of six cars can be handled.

Work is now simultaneously taking place on both the driving of the platforms and the building of the stations. There are three of them, and unfortunately, they are still designated only by numbers -- 1, 2, 3. Although the board of directors of the subway system being built long ago sent their proposals for the naming of the stations to the city organizations; there still has not been a reply.

Station No 1 will be located in the vicinity of trade enterprises -- the self-service department store and the department store -- which are in the Kilometer-8 Settlement. The second station will be in the vicinity of the Baky movie theater on Profsoyuznaya Street. The third one will be placed on Ukrayna Square.

It is self-evident that bus routes, which will connect the eastern quarters of Akhmedlov, the settlements of Razina and Serebrovskiy, and other places, will join these stations.

The collective of the Baktonnelstroy SMU [Construction and Assembly Administration]-3 will build the passing tunnel from Neftchilyar Station to station No 1, and the collectives of SU [Construction Administration]-2 and tunnel detachment No 7 will drive the other two tunnels. The construction of all three stations has been entrusted to brigades in the 28th Tunnel Detachment.

The plan provides for the commissioning of the eastern section of the "underground" during the 12th Five-Year Plan.

The 28 April Station -- the Baku subway's main point where the main Baky Soveti-Neftchilyar and Adzhemi-Shaumyan lines intersect -- will also be reconstructed during the metro system's third construction phase. The fact that trains can pass through it only on one line is a substantial shortcoming of this point. It complicates the organizing of consist movements. For example, a train, which is travelling from the Gyandzhlik Station, cannot enter this station until the consist, which has arrived from Shaumyan Station has departed. For this reason trains often have to wait in the tunnel while the station is being cleared.

It is also necessary to keep in mind the fact that the load on the 28 April Station grew by quite a bit when the second phase of the subway system was commissioned.

The operation of the "underground" shows that the commissioning of the subway's third phase will be impossible without "undoing" this knot. Foreseeing the difficulties, a decision was made to reconstruct the junction.

The siting of newly constructed additional small stations, which were located to the sides of the main station, was included on the diagram. Independent routes in two directions for the Adzhemi-Shaumyan line, which nowhere crossed with each other, passed through them. Only the Baky Soveti-Neftchilyar line will service passengers at the presently existing station.

The driving of the left and right side station tunnels and the escalator tunnel to the station square is being completed today at the installation undergoing reconstruction where the SU-2 and SMU-3 brigades are working. The driving of the distribution hall tunnels is taking place for both the right and left parts of the stations being built.

The construction of a nine-story building, where the "underground's" engineering services and automatic telecontrol will be accommodated, has been provided for near the 28 April Station.

The subway system's 3rd construction phase also includes the building of the northern section which will begin at Adzhemi Station and go in the direction of the Darnagyul area and embrace the sixth, ninth, seventh, and eighth micro-ayons as well as the settlements of Kirov and Vorovskiy. The construction of three stations with open lines four kilometers long and the building of a combined depot for trains are being provided for.

A special discussion of Baky Soveti Station is needed. As is known, travel there is one-sided as before. The prepared platform on the opposite side is not being used. This creates inconveniences for people. Moreover, until a train, which has filled with passengers, has departed, another cannot approach the platform. Each passenger's time on the road is increased. That is why the question about constructing a so-called circular arrival behind the Baky Soveti Station is so acute. A train will then have an opportunity to approach for boarding from the opposite direction after passengers have gotten off. Consequently, the number of receiving and dispatching stations for trains will grow. If the circulating arrival is not built, the unfinished status of Baky Soveti Station will become a brake on accelerating passenger transport after the reconstruction of the 28 April Station.

The Ministry of Railways had not released assets for this construction up to last year. They have now been allotted. The customer and Bakmetroproyekt [Baku Subway Design Institute], however, have not found an organization to perform prospecting work. All 13 organizations, to whom they have turned, have refused to undertake this work. If the allotted money is not used, it will be lost. The help of higher organizations is required to solve this question.

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## RAIL SYSTEMS

### FUTURE MOSCOW METRO TIMIRYAZEVSKEYA LINE STATIONS DETAILED

#### Chekhovskaya to Savelovskaya Segment

Moscow GUDOK in Russian 8 Jul 86 p 4

[Article by B. Kolesnikov: "From Chekhovskaya to Savelovskaya"]

[Text] We continue our discussion of the future stations on the Moscow subway system's Timiryazevskiy line -- a priority project planned for completion during the present five-year plan.

After the opening of the Rizhskaya subway station on 1 May 1958 when the Prospekt Mira-VDNKh [Exhibition of the Achievements of the USSR National Economy] section of the Kaluzhsko-Rizhskaya line was commissioned, Savelovskiy remained the only railroad station in the capital without a subway. During the years that have passed, the appearance of the square near the railroad station, where several streets -- Novoslobodskaya, Butyrskaya, Lower Maslovka, and Sushchevskiy Val-- meet in a busy people and transport crossroads, has changed beyond all recognition. A three-deck bridge, over which the high-speed main line -- the V-ring -- passes and which is the largest in the country, has appeared here. Every day, however, the passengers, who get off the more than 120 pairs of electric trains, must go to the closest subway stations -- Novoslobodskaya or Belorusskaya -- in order to get city transport as before.

Not so long ago, one of the dead-end tracks on the Savelovskiy avenue was connected with the Kurskiy line. However, it only partially eased the load on the buses and street cars that operated within the area of the railroad station square.... The Savelovskaya subway station, which is being built, will solve this problem. It will open in 1988 and will connect the railroad station with the center of the city by a direct underground route.

N. Aleshina, the chief architect for Metrogiprotrans [State Institute For Designing Subway Transport], continued her story: "The second phase of the Timiryazevskaya line will travel through old Moscow's preserved places. The Tsvetnoy Boulevard Station will follow the Chekhovskaya. It will be located on the similarly named boulevard, and its surface entrance will occupy the first floor of a new administrative building. Nearby is the House of Political



Enlightenment of the CPSU Moscow Oblast Committee and the Moscow City Committee, a circus that was built from the bottom up on Tsvetnoy Boulevard according to old plans, the Mir movie theater, and the Central Market. They are planning to construct the new building for the Maly Theater of the USSR here -- on the boulevard -- also."

The Mir movie theater is one of the largest halls in the capital. The first showing of panoramic and then of wide-screen films in the country began in it. All of Moscow's international film festivals have taken place in the Mir and many outstanding figures in the Soviet and world film industry have appeared on its stage and met with Moscow audiences. It has been decided that -- from a thematic respect -- the Tsvetnoy Boulevard subway station will reflect the achievements of the Soviet film industry, circus, theatrical arts, the multinational Soviet culture, and lecture propaganda that contributes to the communist indoctrination of the workers.

The Novoslobodskaya Station is still the only one on the circle line that does not have a transfer point. After the opening of the Mendeleyevskaya Station, it will get a passageway for passengers from the ring to the radial Serpukhovsko-Timiryazevskaya line. Based on its design, the Mendeleyevskaya Station is a station of the pylon type (similar to the Kuznetskiy Bridge Station); however, its decorations will have only one analogue in the Moscow subway system -- the Kurskaya Radial Station. According to the concept of the architects (the architects are N. Aleshina and N. Samoylova), the subway station will be finished in white marble -- "Koyelga" -- and grey marble quarried in the Ufaleskiy mountain range in the central Urals.

The theme of the Mendeleyevskaya Station will be the history of the development of our native science. One can get from the underground entrance of the subway station to Novoslobodskaya Street by an operating pedestrian underpass to its opposite side toward Lesnaya Street where the buildings of the two largest VUZ in the country -- the Chemical Technological Institute imeni D. I. Mendeleyev on Miuskaya Square and the Moscow Institute for Rail Transport Engineers on Obratsova Street -- are located not far away.

Finally, the third station in the second phase -- the Savelovskaya Station. Its styling is devoted to the history of rail transport. The capital's smallest station was opened during the last year of the last century when a steel thread, which connected Moscow with Petersburg through Savelovo, Rybinsk and Uglich, was laid to the upper reaches of the Volga. This page from the history of the development of rail communications in Russia, just as other landmarks in it, will be reflected in the artistic paintings on the underground hall.

The Savelovskaya Station is also of the pylon type and built deeply down. Two entrances to the underground entrances on the square near the station and on the opposite side of the bridge toward Novoslobodskaya Street have been planned for its ends.



### Savelovskaya to Otradnoye Segment

Moscow GUDOK in Russian 30 Jul 86 p 4

[Article by B. Kolesnikov: "The Northern Ray"]

[Text] Our trip to the future stations of the subway's Timiryazevskaya line -- a priority project planned for completion during the 12th Five-Year Plan -- ends at the last section of the route-- from Savelovskiy Railroad Station Square to Otradnoye.

It seems that a question, which is elementary for long-time Moscow inhabitants, will not be on the lips of even the energetic experts on the popular television show "What? Where? When?" -- I doubt whether they will be able to give correctly the address of the Savelovskiy train station: "Butyrskaya Gate Square". No, the name has not changed; it is still preserved in the Ministry of Railways posters entitled "Passenger Train Schedule from Moscow Train Stations", in tourist guides and in route directories although we became accustomed long ago not to using the true name of the square which comes from the village of Butyrki that was located on the northern outskirts of Moscow and was well known from the 16th century.

It is from here -- under Butyrskaya Street -- that the underground main line, which is 8.6 kilometers long, begins. Its purpose is to bring the thickly settled blocks of new construction of the "northerners"--the inhabitants of Lianozov, Bibirev, Otradnoye, and the suburbs in the area of the October Railroad and the Savelovskiy route of the Moscow Railroad -- to the center.

N. Aleshina, the chief architect of the Metrogiprotrans Institute, has unfolded a sketch map of Moscow on the table and, having placed a ruler on it, connected two points: the terminal metro stations -- Rechnoy Vokzal and Babushkinskaya. Having done this, the straight line passed exactly through the intersection of Dekabristov Street and Severniy Boulevard.

Nina Aleksandrovna, having drawn a circle on the intersection, explained: "Here will be the last subway station on the Serpukhovsko-Timiryazevskaya line. It will be located on one city geographic "latitude" just as the terminal points of the subway route bordering on it. This principle of equidistance will permit us to build another subway ring parallel to the super-highway ring in Moscow during the 21st century... but let us return to Butyrskaya Street where they are building the Dmitrovskaya Station between Khutorskaya Street and the tracks of the Riga railroad route.

This subway station will have one underground entrance through which passengers will get to both sides of Butyrskaya Street and to the Dmitrovskaya suburban platform. The theme of the station's styling will be the "Defense of Moscow. The Destruction of the German Fascist Troops at Moscow in 1941".

The next station on the line will be the Timiryazevskaya. It will be located close to the Molodezhnaya Hotel not far from the park and small town of the Agricultural Academy imeni K. A. Timiryazev. They are building this type of station -- single-vaulted and deeply underground -- for the first time in Moscow. Having climbed from the underground entrance, it will be possible to cross to both sides of Dmitrovskoye Highway to a pedestrian underpass and to the Timiryazevskaya suburban platform of the Savelovskoye route.

The Petrovsko-Razumovskaya subway station will be opened in the area of the intersection of Oktyabrskaya Road and Moskovskaya with the exit to Lokomotivnyy Thoroughfare and to the Petrovsko-Razumovskoye platform. Its theme will reflect the history and achievements of Soviet agricultural science.

The next to last station on the line -- Vladykino -- is a subway station of the column type, shallowly dug and with two surface entrances. The architectural and artistic styling of the station is devoted to the development of tourism in the USSR. This is not surprising -- you see, the Altay, Vostok and Turist hotels, which are known throughout the country, and the Sputnik Bureau for International Youth Tourism are located nearby.

The final point on the route is Otradnoye. The station is single-vaulted and dug shallowly. Its styling is devoted to the memory of the Decembrists. The Otradnoye Station will be a convenient transfer point for passengers in the housing areas of Lianozov, Bibirev and Medvedkov; and the adjacent Vladykino and Petrovsko-Razumovskaya stations -- for the inhabitants of Bezukudnikov and Degunin, respectively.

The construction of the Timiryazevskaya line will also solve the problem of unloading public transportation on the Dmitrovskoye, Aptufyevskoye and Korovinskoye highways and on Butyrskaya and Novoslobodskaya streets. On these main lines, movement speed will increase and the number of buses, now arriving at the Novoslovodskaya subway station, will significantly decrease. The freed pool of vehicles will begin to carry passengers to the new subway stations. This will decrease by quite a bit the time which they now spend travelling to the center of the city and to other areas in the capital.

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## RAIL SYSTEMS

UDC 624.193

### SINGLE-VAULTED STATIONS BUILT FOR KHARKOV METRO

Moscow TRANSPORTNOYE STROITELSTVO in Russian No 6, Jun 86 pp 16-19

[Article by V. A. Reusov, pro-rector of the Kharkov Construction Engineering Institute and R. I. Lyubarskiy, lecturer at the Kharkov Institute of Municipal Construction Engineers: "Rebirth of Single-Vaulted Stations"]

[Text] In Competition for the USSR Council of Ministers' Prize--  
The group of direct participants in the design and construction of the initial sector of the Kharkov metro Imeni V. I. Lenin's second line is presented in competition for the USSR Council of Ministers' Prize for the originality of their design decisions, the high level of organization and execution of building and installation work, which insured a significant increase in the efficiency of capital investments.

The most complicated, labor intensive and costly projects in an underground railway system are the stations. The length of time to construct the station units as a rule determines the line's overall construction period. During the entire subway building period, work continues on improving the designs and methods for building the stations, reducing the specific consumption of materials and increasing industry [industrialnost] and reducing the construction periods and improving spatial planning decisions. This is particularly important now that construction of a large number of stations, of which about half will belong to lines for development of outlying districts of cities and be built out in the open, is being planned by the long-range plan for development of the country's subway systems.

Most of the open stations which have been built to date have a rectangular cross-section, an island platform and two rows of columns spaced 4 and 6 meters apart. Their load-bearing designs consist of reinforced concrete components: trough and wall units, columns and footings, cross-beams, covering plates, etc. The design of such stations differ one from another only by a certain configuration of the overhead covering, and in finished form, by architectural details and the range of colors available for the finish. As regards design, the column stations call for difficulties; they require a large number of components of various dimensions, and several such stations built side by side present a sad picture of monotony.

In studying shallow underground stations, comparing their designs, construction methods, planning decisions and technical and economic indicators, it became apparent that single-vaulted station designs were promising. Both deep and shallow underground single-vaulted designs have attracted the attention of designers and builders. Single-vaulted stations have a merit inherent only in this type of design -- the possibility of placing the entire station complex, buildings of different dimensions under a single structure, a fact which reduces the labor intensiveness and specific consumption of materials during construction.

The first two single-vaulted stations in our country were built in Moscow before the war. The first, the "Lenin Library Station," was built using a complicated and labor-intensive method with great expenditure of qualified manual labor and great technical difficulties, which played a negative role in resolving the question of their further utilization. Therefore the experience in developing the design for another Moscow station, "Airport," an open type of design which was original for the time, was not given attention. Single-vaulted stations were critically evaluated in the 1960s. However design work did not progress any further. The reason was the complexity of the decisions being proposed and the limited extent to which they could be utilized, as well as the manufacture of the structures and transporting them. Moreover, there existed an opinion about the discomfort of single-vaulted stations and a psychological instability of passengers on platforms without supports during the approach of the trains. This resulted in a certain stagnation of technical progress and creative striving to search for new designs during the 1960s. As a result there came to be entire subway lines, on which the stations were built based on the same blueprint with a longitudinal spacing of columns. This caused a general monotony, unexpressive architecture and operating inconveniences in the planned decisions.

Taking this fact into consideration, we returned once again to single-vaulted structures in 1968 in designing the Kharkov subway system. The technical and design decisions accumulated by experience were analyzed and the possibilities for developing an optimal single-vaulted structure, taking into consideration spatial planning decisions which provide for maximum passenger comfort and uninterrupted operation of underground transport, were worked out. Under the broadly developed first stage construction conditions which had developed, when there is no production base for the manufacture of precast reinforced concrete articles, a vaulted station made from monolithic reinforced concrete was proposed by Kharkovmetroproekt's [Kharkov Underground Railway System Design Office] designers, one which permits acceleration of construction of the subway's first line.

There are presently 7 single-vaulted stations on the Kharkov metro lines, the designs and construction methods for which, along with a series of other progressive decisions, permitted construction to be carried successfully and the start-up lines for the subway system to be put into operation ahead of schedule. It may be considered that the open single-vaulted station was reborn with construction of the Kharkov subway system, but only in a new form, with well-developed spatial planning decisions.

The design for a monolithic reinforced concrete vault which was constructed using metal concrete forms available from inventory was proposed and developed



for the first time in the history of domestic subway system construction. The further refining of spatial planning and design decisions permitted us to replace the more labor-intensive monolithic support sections with precast structures and expand the area for cashiers' rooms significantly by placing them above the cross vault entranceways. The "Academician Pavlov" Station, developed entirely from precast reinforced concrete, has become the consummation of process of industrialization of single-vaulted station construction.

The design and development of vaulted designs in Kharkov should be divided into 3 stages. According to the plan worked out in the first phase by the Kharkov-metroproyekt group, the single-vaulted design was successfully realized simultaneously at 3 stations of the first start-up section on the first route of the Kharkov subway ("Central Market," "Sportivnaya" and "Moscow Prospect"), as well as at stations of the Tashkent, Tbilisi and Minsk subway systems.

As this single-vaulted design was being developed, the classic framework of the Moscow subway's "Aeropot" was known, as well foreign monolithic stations built in Japan, France and other countries and the planning development of precast vaulted thrust stations done by the Metrogiprotrans [State Institute for Subway System Planning and Transport].

The proposed Kharkov design (Fig. 1) repeats none of them and turned out to be the most favorable. The geometry of the vault is in the form of a semiellipse with radii of 6.45 and 12.20 meters and a span of 19.7 meters. The support sections are erect, and the abutments, which are the vault's foundation slabs, are turned inward. A tie-beam is installed between the slabs, and it serves as a gutter in the station design. The exterior dimensions of the single-vaulted station do not exceed those of the foundation pit needed to erect the column-type station. The speed of erecting a vault using a single set of steel concrete forms available from inventory when flow-line delivery of concrete, reinforcement framework and units made on site at a centralized location are available made it possible to erect a 24-meter vault in 1 month.

The spatial planning decisions which were arrived at permitted the entire list of the basic, service and mechanical facilities for the station complex to be placed under the vault, insuring the unity of the design decision and efficient construction technology. The length of the station's vault is 238 meters. The entryways are not isolated from the platform area and comprise a unified whole, united by broad, open stairways. The end of each entryway is adjoined by service and mechanical units, at two stages of which corridor-type lay-out was made. The stories are joined by a stairwell. Placing the basic ventilation and step-down substation chambers under the vault permitted us to use the remaining space in the second tier as ventilation joints and as housing for equipment, thereby reducing the length of the complex by 24 meters in comparison with column-type stations.

Improving the vault design in the subsequent stage, it was proposed to erect the vault from precast monolithic reinforced concrete, where the very labor-intensive preparation of the supporting portion of the concrete framework was replaced by precast reinforced concrete components (Fig. 2). The precast structure for the support wall is a unit with an opening for installation of a cable duct, which obviates further installation of track wall units for running cables.



Replacing just the supporting part of the vault with precast structures permitted a monetary savings of 16 percent in comparison with monolithic structures and a 21 percent reduction in concrete volume and man-hours per job. Installation of the cross vault within the confines of the entryway permitted us to enlarge it, accommodate all necessary facilities and bring its size up to the dimensions of the entryway of a column-type station. This has afforded great opportunities for distribution of irregular passenger flow. Three precast-monolithic stations have been constructed in Kharkov: "Imeni Soviet Army," "Tractor Plant" and "Kiev".

The final stage in forming a fully precast single-vaulted station design (Fig. 3) has now begun. In the general design scheme, the vault is the most complex part, both in the sense of design and of technology, but it is precisely the development of the precast vault, the concluding process in the development of a fully precast industrial design that makes a substantial savings by virtue of the reduction in the man-hours of labor to construct the station. The development of a braceless fully precast single-vaulted structure from reinforced concrete components is the logical continuation in the improvement of the Kharkov designs, as well as in the volumetric spatial decisions for single-vaulted station complexes in the direction of increasing the industrialization of construction and reducing the specific material consumption and labor-intensiveness.

The new station design has the same general dimensions as a station with a monolithic vault, for practical purposes, and it differs from it in the design of the vault, which consists of individual arcs with a span of 1.2 meters. Each arc is formed by 3 hollow factory-made units weighing 10 tons. The platform section of "Academician Pavlov" Station is being completed with these structures (Fig. 4).

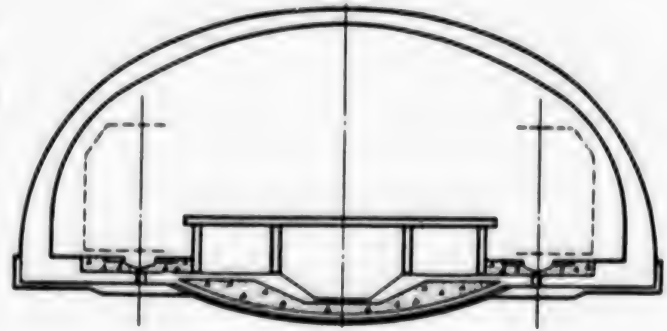


Fig. 1

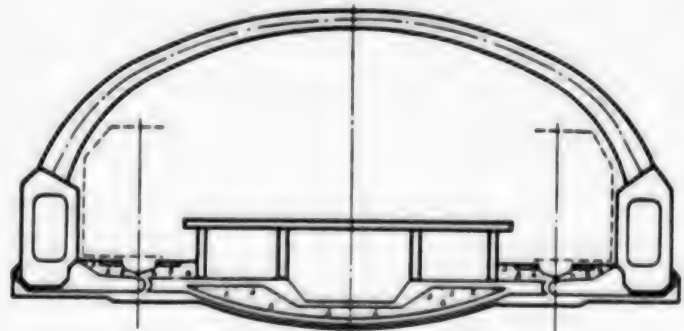


Fig. 2

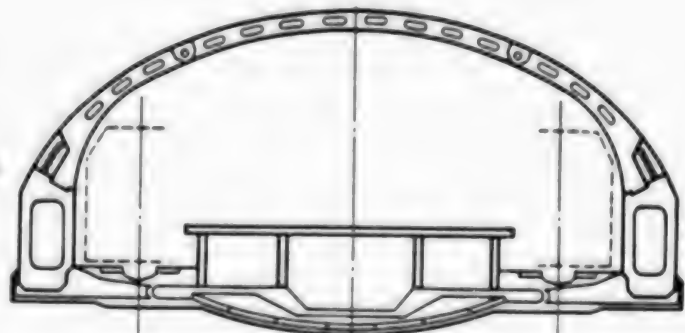


Fig. 3

Working documentation of the precast single-vault station was provided in accordance with a technical assignment of the TsNIIS [Central Scientific Research Institute of Transport Construction], which also studied the stress deformation of the structures during construction.

The new stage in the development of single-vaulted designs is one of principle inasmuch as it signals the elimination of large-scale wet processes on the construction site, and it has reduced labor costs for erection of load-bearing structures by more than a factor of 2 and cut metal consumption by 23 percent and concrete consumption by 13 percent in comparison with the station's first monolithic reinforced concrete variation.

Six stations are now in use on the Kharkov subway system lines, and a seventh will be placed in service in the near future. In spite of the fact that they are built to the dimensions of a single design plan, the use of dissimilar plate for the vault surfaces, individualized lighting, surface texture and the color of facing materials and architectural details made it possible to impart individual features and architectural expressiveness to each station, preserving all the while the unified stylistic decision. A unique design arising out of the name of the station and its city designing and building position was found for each of the 7 stations.

The "Central Market" station has a vault with an untouched smooth surface which was obtained with the aid of the metal concrete forms. While remaining a transport structure with its strict functional trend, the station calls out to structures designed by civil architecture with its spatial resolution. The hanging lamps are a characteristic feature of the station. They are made of aluminum, and outfitted with fluorescent lamps. The track walls, faced with gray marble, appear to continue the contour of the vault. Decorative insets are distributed along the walls at a specified interval. These insets are carved into the marble.

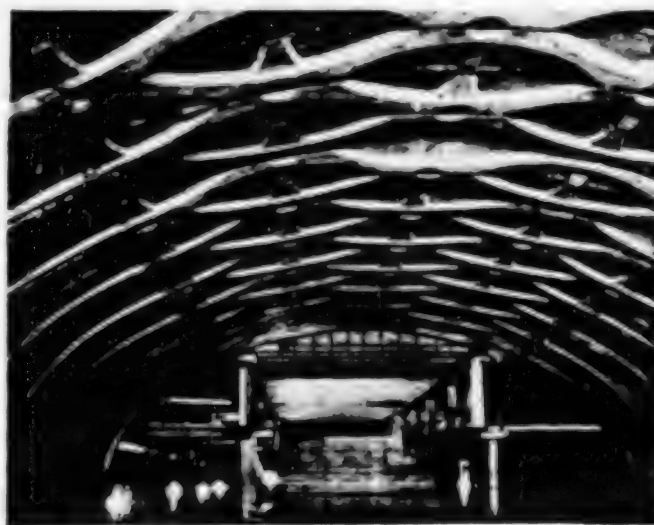


Fig. 4

As regards emotion, the interior of "Sportivnaya" station creates the sensation of a holiday mood. This perception is facilitated by the conjunction of the structural slab of the white vault surface, which is shaded by a socle of black labradorite, and the red color of the platform's granite floors. The interior surface of the vault structure is assembled from modular triangular reinforced concrete components which were pre-poured on the metal surface of the forms to create a monolithic unit within the thickness of the vaulted ceiling. The cross joints between the components emphasize the geometry of the vault well, while the diagonal joints visually part the space of the station hall, calling to mind the space of large sports structures. The lighting, in the form of point light sources distributed over the surface of the vaulted ceiling sets up a play of light and shadow and reveals the sheet of the vault's reinforced concrete surface well. The geometric picture of the floor, made of polished granite slabs, is similar in nature to the shape of the vault components. Stairways extended onto the platform have handrails faced with marble having a spread of colors ranging from black slabs to light pink in the direction of the entryway.



Fig. 5

The solution for the interiors of the "Moscow Prospect" station is coordinated with the architecture of the surrounding industrial region. The use of large-scale articulation with emphatically laconic details which reveal the monumental nature of the industrial architecture is a feature of the station. Large, round ceiling lamp fixtures with fluorescent lamps set like spokes and seemingly cut into the smooth surface of the vaulted ceiling are inherent. The track walls, with the rhythmical, alternately protruding and sunken surfaces, are treated as supports for the vaulted ceiling, and are faced with polished sheets of labradorite. The range of colors for the station is strict and restrained. The finish for the station entryway is carried out in a unified stylistic solution.

The use of platform candelabra [torshery] to light the station hall is a feature of the architectural solution of the station "Imeni Soviet Army." Each candelabrum has a brass bowl 1500 mm in diameter which is equipped with

mirrored incandescent bulbs. The candelabra illuminate the caissoned vault, which has been stamped using a moveable form, the surface of which had been specially prepared before hand. The track walls are faced with polished slabs of red granite with inserts in the form of brass shields with a star. There are lamps for decorative sublighting of the ceiling behind each shield. The sternness and the monumental nature of the details is coordinated with the name of the station. The red color of the floor granite and the track walls in conjunction with the yellow of the polished brass candelabra bowls and the shields on the walls and the white of the vaulted ceiling with its intersecting diagonal ribs.

The area of the cashier rooms in the entryways has been significantly expanded, to the size of the cashier room of a column-type station at this station and at the "Tractor Plant" station. The shape of the vaulted ceiling at "Tractor Plant" station is perceived differently by the viewer from various sides due to ledges present in the design, which were made with the aid of alterations in the concrete form surfaces. Groups of fluorescent lamps are placed at sector joints, in the folds of the vault fall [perepad]. The solution of form for the station is realized due to the wide span of the facility, the laconicism of detail and the heraldic elements on the track walls based to the theme of the plant.

At "Kiev" station (Fig. 5), the space is covered by a unified vaulted structure. As an architectural component, the arc, form stamped from cast-in-place reinforced concrete, covers the entire surface of the vault of the expansive space in the station hall with a structural filigree [vyaz], calling up with its form the old Russian structures of ancient Kiev. The vaulted ceiling is supported on the track walls, also composed of arcs, but of larger form. The thematic content of the station is revealed in the decorative faience compositions and placed within the space of the track wall arcs. The overall architectural and artistic solution is augmented by the chandeliers, calling to mind clusters of white blossoms on the background of the white vaulted ceiling and the white facing of the walls; all of this presents a unified compositional decision for the station interior.

At "Academician Pavlov" station, the basic architectural decision was immediately laid in the design for the forms for making the reinforced concrete components under plant conditions. The pre-worked coating of the vault in the form of a biological structure reflects the contents of the station, and it is coordinated with the overall architectural solution. Reinforced concrete components were designed for laying the pipelines, the installation of which simultaneously aided in solving a number of problems on the way to further industrialization of construction and architectural finishing work. The station lighting calls for ceiling lamps with mirror incandescent lights situated evenly over the surface of the vaulted ceiling. Information directories for passengers are grouped in 3 places on the platform in candelabra equipped with four-sided back-lighted screens. The candelabra with benches are a unified unit. Gray marble is used to finish the facility's walls. Semi-ovular inserts faced with dark marble with informative texts are located along the track walls in a definite pattern.

The cumulative experience in design, construction and operation has shown that the single-vaulted stations of underground railway systems and the underground sections of express trolley systems which use the Kharkov design are applicable

for practically any hydro-geological conditions and seismic zones, and, depending on the degree of industrialization of construction operations, are in no way inferior to the column-style stations of traditional design using pre-cast reinforced concrete. The use of single-vaulted designs makes it possible to construct a station on an industrial basis, using a flow-line method throughout the entire closed cycle, to use subterranean space more completely, to develop architectural specimens with individual features which correspond to the functional and municipal planning needs for subway stations, and to provide a high level of passenger comfort.

Photos by A. S. Leybin

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## RAIL SYSTEMS

### NOVYY URENGOY-OZERNAYA RAIL LINE OPENS

Moscow GUDOK in Russian 1 Jul 86 p 1

[Report by GUDOK special correspondent N. Davydov: "The Arctic Route Is in Operation"]

[Excerpts] Novyy Urengoy-Yagelnaya-Yamburg--The first working train left the Novyy Urengoy station for the Yamburg deposits on 27 June, on the eve of Soviet Youth Day. The honor of opening traffic on the Novyy Urengoy-Ozernaya line fell to the locomotive brigade of engineer V. Levin.

The train arrived at Ozernaya in 14 hours on 29 June. The construction and gas workers welcomed the first freight, and a meeting was held. The line is being built and is in operation.

The last 100 kilometers to the Ozernaya station were completed in record short time--in 5 months this year. The line actually was ready to handle freight and working trains at the beginning of June, but flooding disrupted the builders' plans. Yes, it is impossible not to take it into account in these parts.

The transport construction workers began laying the first kilometers of the line from Yagelnaya to Yamburg in the fall of 1984. And they encountered many hardships right away. The local waterlogged sands that were frozen dry are not very useful for laying a roadbed: they settle a great deal when thawed out. And inasmuch as winter in these regions lasts for nearly 10 months, it is difficult to obtain them.

The work also was complicated by the fact that the builders went into the circumpolar tundra: freezing weather and snowstorms rage here in the winter, flooding creates havoc in the spring, and in the summer up to 70 percent of the surface is covered with lakes, swamps and marshes. For this reason, the main burden was borne by the collectives of the mekhkolonny [mechanized columns] engaged in laying the roadbed. The endurance of both men and machines was put to the test. Nearly every day problems had to be resolved, one more complicated than the other.

"We used the work shift method here, as we did in building the railroad to Urengoy," says A. Navruzov, chief of mechanized column No 87. "But the lack of roads near the line made it difficult to bring in people and supply fuel and spare parts. It was especially hard during the winter.

"You are driving in the column along a winter road and suddenly a blizzard begins. In several minutes you're surrounded by an unbroken shroud of white, so that not even the hood of your own vehicle is visible. Everything happened here: we lost our way, or got stuck in the snow, but it was most terrifying when the engine stopped."

Right here on the Yagelnaya-Yamburg line, in order to prevent uneven thawing of the roadbed's frozen soil, they utilized induced temperature control on a wide scale for the first time: they turned over the frozen soil with special materials, creating a so-called thermal diode. They reinforced the knife-edged support [prizma] of the ballast from the side with peat. During the summer the sand thaws, but because of the steps taken, it settles evenly without coming apart.

And how many problems the bridge builders had to solve! Columnar supports proved to be the most economical for bridges under the conditions given (the permafrost soils are retained). The Mostostroy [bridge-building]-11 Trust had to set up a specialized bridge detachment for drilling to install these foundations over the entire Yamburg route. This made it possible to speed up construction of the different bridges and bypasses significantly. And there are quite a few of them. There are 23 of just the medium-sized and large bridges on the 235-kilometer route. That is, there is a bridge practically every 10 kilometers.

Detours were required in order to maintain the rapid pace of work. Thanks to them, the necessary materials, equipment and rail and tie lattices [relsoshpalnaya reshetki] were delivered regularly to the head of the track-laying train. Bridge detachment No 93 alone laid out 10 detours for large and medium-sized bridges.

The lack of passable roads near the routes had a considerable effect on equipment use and the pace of construction. But the machine operators and bridge builders did not give in to the difficulties. Neither the permafrost, nor the swamps, nor the 40-degree cold, nor the snowstorms cooled their ardor.

However, in order to lay the finished lattice, it must first be put together. Most of the units for the Yamburg line were made at the production base of track maintenance train No 12 near the Korotchayevo station. The lattice assemblers work under the open sky, so they were put to the test many times. It is enough to say that 30-degree cold was typical for more than half the days in February, but in spite of this, it was precisely then that the collective set a distinctive record--it put together 22 kilometers of new units.

This latticework has not been lying around a long time on flatcars on the route, as a rule. The combined brigade supervised by Viktor Molozin, a delegate to the 27th CPSU Congress, laid about 40 kilometers of track, as well

as 30 water pipes, from March to May alone this year. As early as the beginning of June, the rails had reached the 214th kilometer at the Ozernaya station, from where freight for the gas workers will go to the end of the route's construction along a concrete circumferential highway.

Heavy flooding for 2 weeks stopped virtually all operations on the Yagelnaya-Yamburg line. In many places the roadbed was washed away. The bypass on the Khadute River was especially damaged. Then nearly as much time had to be spent on restoration work.

And here on 29 June, as promised, the first working train passed over the new Arctic route. The railroad has come closer to the Gulf of Ob and the Yamburg gas deposits. It is very much needed for the builders of the Yamburg-Yelets main gas pipeline and for those building the gas substations and compressor stations. Without it, it would be simply impossible to fit construction and development of the remote Arctic deposits into brief periods of time.

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## RAIL SYSTEMS

### TRANSBAYKAL RAILROAD EXPERIMENTS WITH SUPER-HEAVY TRAINS

Moscow SOVETSKAYA ROSSIYA in Russian 21 Jun 86 p 2

[Article by SOVETSKAYA ROSSIYA Correspondent A. Gamov: "They Are Gaining Altitude: An Unusual Experiment Has Been Conducted on the Trans-Baykal Railroad," followed by editorial staff note]

[Text] Chita Oblast—Having received the appropriate instructions and put on the working coveralls of a railroad worker, I am sitting in the engineer assistant's seat.

"Experimental train, you have a 'green'," the dispatcher says over the loudspeaker.

"I see the 'green'," responds the engineer-instructor, and gives me the command: "Sound the whistle."

I push down the signal lever. The railroad consist of 100 tank cars weighing 8,000 tons starts off and confidently begins up the grade.

Responding with deeds to the CPSU Central Committee Appeal to workers of the Soviet Union, the Trans-Baykal railroad workers have undertaken a most important task. Completion of it will significantly increase the labor productivity and work efficiency of rail transport. Everything began after the Ministry of Railways planned to organize regular runs by super-heavy trains on the longest section of the Transsib [Trans-Siberian Mainline]—from Irkutsk to Vladivostok. The Chita workers were confronted with many problems in this connection.

The fact is that a good thousand kilometers of the line here continues to be unelectrified. But diesel engines, even coupled, cannot always handle the trains brought by electric locomotives. Moreover, the difficult terrain of the locality—grades and downgrades, steep turns—complicates control of the consists. Heavy trains from the East Siberian Mainline have found themselves "stranded," in fact, upon reaching the Trans-Baykal line. They have often had to "take apart" the train and make it up again.

But as the CPSU Central Committee Appeal stresses, the country needs transport which operates reliably. And a solution was found on the path of accelerated



scientific and technical progress. Scientists and specialists of the All-Union Scientific Research Institute of Railroad Transport came to their assistance. They suggested a unique system of synchronized control by coupled locomotives. The Trans-Baykal railroad workers were the first in the country to begin its experimental operation.

Less than 4 hours from the start of the trip, we had already climbed more than 500 meters. The track we had traveled over a half hour ago was far below. The railroad is buried in thickets of blossoming bird cherry, which look like clouds floating on the steppe from above.

I hold an interview right in the cab of the engine with A. Makurov, senior staff scientist of the VNIIZhT [All-Union Scientific Research Institute of Railroad Transport] and one of the creators of the innovation, at the very moment that our train is getting over one of the most difficult passes on the Trans-Baykal line. Sand poured on the rails by a special device is crunching under the diesel engines' wheels.

On the engineers' small table next to the control panel there is a blocking relay inside a small metal box. This is the synchronizer with the aid of which commands from the lead engine are transmitted to the other locomotives, and then farther throughout the entire consist, which is nearly a kilometer in length.

"When we developed these instruments, we were thinking primarily about the persons working under such difficult conditions," says A. Makurov. "You see, the consists have become heavier, but it has become easier for the engineers. I think that the principal meaning of intensification in rail transport is precisely this."

Engineers A. Kozlov and V. Korniyenko evaluated the innovation this way:

"You are convinced from the very first kilometers of track that you have an indispensable assistant next to you. We are confident that the Trans-Baykal locomotives equipped by the Moscow system will not let the Trans-Siberian Mainline down now."

\* \* \*

Recently the editorial staff received news that regular runs had been begun over the entire length of the Trans-Baykal Railroad by the 8,000-ton super-heavy trains.

Promising new means of control for diesel engines will also begin to be utilized in the current five-year plan on the Moscow, October, Northern, and 10 other railroads in the country. We think that such an approach responds in full to the call voiced in the party's Central Committee Appeal to conscientiously work for the common good, to demonstrate initiative and to treat the work with which we have been entrusted responsibly.

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## RAIL SYSTEMS

### 'TRANSPORT' RAILROAD COMMUNICATIONS SYSTEM DISPLAYED

Moscow GUDOK in Russian 11 Jul 86 p 1

[Article by Yu. Zakharyev under the rubric "Invitation to the Display Stand":  
"'Transport' Radio"]

[Text] What railroad worker has not dreamed about reliable radio communications? Engineers and transport workers, power workers and railwaymen—everyone, from worker to supervisor, knows that in our age a train cannot be run or a catenary system or track repaired without efficient communications.

Equipment of the "Transport" radio communications system is on display at the first Soviet pavilion.

Notations in the visitors book attest to increased interest in the innovation:

"This equipment is very much needed to transmit information on the seats occupied on a passenger train," an engineer from the Kashira Division believes.

"Noise is harmful for the locomotive engineer. The system will improve work conditions for thousands of engineers," railroad workers from the North Caucasus Railroad write.

"At one time I worked as an engineer and the chief engineer of a depot," V. Kozubenko, a lecturer from the RIIZhT [Rostov-on-Don Institute of Railroad Transport Engineers] with whom we viewed the exposition, told me. "I know from my experience how the radios in the engineer's cab operate. You would not be able to shout to the assistant stationmaster because of the noise and crackling. We have been conducting research at the RIIZhT recently. It was found that in passing long stations the pulse rate of locomotive brigades rises by 20-30 beats per minute and nervous tension is increased."

The new system operates silently. Compact units will be built into the dispatcher's desk and the engineer's panel and will be used by repair workers and railroad workers of all occupations. They resemble telephones with small lighted display boards. By dialing the number of the train by pressing buttons, the dispatcher is automatically connected with the engineer and the

key consist for the section. By pressing the appropriate button, the engineer will be able to call the dispatcher, his counterpart from an oncoming train, the assistant depot master, and a number of other users with whom communication is so necessary on the line of travel.

"And how was the new communications system developed?"

"We began with an analysis of the communications facilities in operation today in transport," V. Botashev, chief engineer of a main administration of the Ministry of the Communications Equipment Industry, explained. "Drawbacks of the radio stations with the ZhR-U unit also suggested ways of resolving the problem. About 30 different types of radio stations which have two frequency bands--160 and 330 megahertz--have now been developed. Owing to modern technical facilities, they are highly reliable, simple to operate, and capable of operating under the most adverse climatic conditions. Their communications quality is 10 times better than that of existing facilities."

"Who developed the 'Transport' system?"

"Specialists and scientists of the Voronezh NII [Scientific Research Institute] of Radio Communications, the Ternopol Design Bureau, the VNIIZhT [All-Union Scientific Research Institute of Railroad Transportation], designers from the KB [design bureau] of the Signals and Communications Main Administration of the Ministry of Railways--in a word, a large detachment of scientists and engineers."

"Viktor Nikolayevich, many railroad workers are interested in finding out the present status of work on the 'Transport' system."

"Following successful tests on the Lvov Railroad, plants began series production of the equipment. It will go to railroad transport enterprises in coming years. At the same time, equipment will be accompanied by improvement in the system. We are thinking about its second stage as well--satellite communications."

The entire radio communications system will be made up of three subsystems: "Transport-PRS" train communications, "Transport-RORS" maintenance operations communications, and "Transport-RS" station communications. Each one of them will include a combination of radio stations--fixed and portable. The subsystems are linked well with each other. The radio equipment itself is 85 percent multipurpose. This means that it will be easy to interchange components.

Yu. Klevanskiy, senior staff scientist of the VNIIZhT, familiarized us with details of the capabilities of train radio communications--elements of the "Transport" system. Interesting details. It takes just 3 seconds to call a user. The stations of today "connect" on the average in 15-30 seconds. Rapid and silent operation--this is what distinguishes the innovation. And what convenience they promise for the engineer and the dispatcher!

"Buttons with the most common commands for the engineer are arranged on the dispatcher's radio station panel. Now he receives an instruction without superfluous discussion to proceed at maximum speed or to increase vigilance. And this button here is for an emergency call. It goes through even if the channel is occupied; the engineer's display board lights up and he is obligated to respond to the dispatcher."

"And if the engineer does not respond?"

"In such cases, the dispatcher can stop the train without the locomotive brigade's participation."

The new radio communications system will be very useful to maintenance workers. In a word, all services of railroad transport will receive modern technical equipment which increases efficiency and productivity and ensures the safety of train traffic.

Fraternal socialist countries are taking part in equipping Soviet railroads with the "Transport" system. Bulgarian RN-12B portable radios are already being used on the lines. The RK-1 shortwave radio will be produced in the GDR. Incidentally, it is being shown here at the "Railroad Transport-86" exhibition, at the GDR pavilion.

Railroad workers are waiting eagerly for The "Transport" radio communications system.

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## RAIL SYSTEMS

### ARMENIA'S IDZHEVAN-RAZDAN RAIL LINE NOW OPERATIONAL

[Editorial Report] Yerevan KOMMUNIST in Russian 9 August 1986 carries on page 1 a collection of articles heralding the 9 August opening of the newly completed Idzhevan-Razdan rail line for regular traffic operations. This new line gives Armenia a third rail connection with other republics. The 85.2-kilometer electrified rail line includes nine stations and junctions: Idzhevan, Lusabats, Goshavank, Kuybyshevo, Dilizhan, Fioletovo, Megradzor, Kakavadzor and Razdan. Along the route there are 20 large bridges and viaducts, as well as 7 tunnels with a total length of 16.3 kilometers.

CSO: 1829/291

## MARITIME AND RIVER FLEETS

### MINISTRY ACTS TO IMPROVE MARITIME PORT AUXILIARY FLEET

Moscow VODNYI TRANSPORT in Russian 20 Jun 86 p 2

[Unsigned article under the rubric "Following our articles": "Port Fleet Sounds the Alarm"]

[Text] Problems raised in material under such a heading, which was published in our newspaper on 22 February 1986, were examined at a session of the collegium of the USSR Ministry of the Maritime Fleet.

In response to the editor, the chief of the Ministry of the Maritime Fleet (MMF) Planning and Currency Finance Administration, G. Gerasimchuk, reports that the MMF collegium examined the question "On Tasks for Developing and Improving Use of the Port Fleet." The port fleet's shortage of auxiliary, maintenance, and other vessels is one of the reasons for transport vessels' loss of time on auxiliary operations.

Unfortunately, it is impossible to resolve the problem of replenishing sector enterprises with this type of fleet completely in the 12th Five-Year Plan. This is because deliveries by the country's shipbuilding industry, including imports, comprise only 12 percent of the ministry's total requirement. The collegium examined and approved a shipbuilding plan for MMF enterprises for 1986-1990, fulfillment of which would satisfy another 49 percent of this demand. Taking into account the scarcity of all types of auxiliary, maintenance, and passenger ships for local lines, the collegium examined and approved a plan for distributing them throughout the steamship companies for 1986-1990.

The collegium instructed the V/O Mortehtsudremprom and V/O Morstroyzagranpostavka, with participation of affected ministry subdivisions, based on the immediate port fleet needs for the future, to work out questions concerning the specialization of one or several active ship repair yards for shipbuilding, taking into account their renovation, and as an alternative the feasibility of setting up in the 13th Five-Year Plan enterprises for building ships for the auxiliary, technical, and other fleets.



For more effective use of vessels in operation, the collegium instructed the chiefs of steamship companies and ports and directors of ship repair yards:

--to examine and adopt decisions for extending the operating life of vessels, previously planned for decommissioning in the current five-year plan;

--to ensure bringing the shore base of the port fleet and local passenger lines into proper technical condition by modernization and technical re-equipping using funds for the development of enterprises and resources allocated for their capital repair. The V/O Morstroyzagranpostavka has been instructed, in developing a plan for capital construction for the 12th Five-Year Plan, to examine the proposals of steamship companies and provide for the necessary measures and financing (within the allocated limits of capital investments for developing the sector's shore base) to satisfy to the maximum the needs for construction, renovation, and technical re-equipment of shore installations of the port fleet and local passenger lines;

--to take steps to improve the planning and organization of auxiliary fleet work. Develop and determine an effective system of monitoring the effective use of these vessels. Ensure widespread joint use of the auxiliary fleet of enterprises located in the same or neighboring waters areas;

When compiling orders and distributing annual limits for repair of vessels at ship repair yards of the sector and other departments and also for replacement spare parts, in addition to the transport fleet, take into account as much as possible the needs of the port fleet.

--to eliminate existing shortcomings in meeting the repair and operating needs of port fleet vessels for metal products, ship paint, materials, batteries, items for craft supply, and other general industrial purpose items. At the same time, the V/O Morteckhsnab has been instructed to take steps to improve the organization of port fleet vessel support and increase the funds for missing materials and set items and equipment needed to support operation and repair of auxiliary fleet vessels.

In the 12th Five-Year Plan we will implement a phased transition of all categories of production workers to new salaries and wage rates at the expense of the enterprises' own resources. The collegium instructed the chiefs of steamship companies and ports:

--to analyze the existing systems of morale and material incentives for auxiliary fleet vessel crews, aiming towards increasing the quality of servicing and reducing the stays of transport fleet vessels in ports, and maintaining port fleet vessels in the proper technical condition;

--to conclude the transition of port fleet vessel crews to working under the collective contract method with distribution of the overall earnings using the labor participation ratio and, where economically feasible and working conditions permit, to methods of group servicing of individual types of vessels.

Today work has begun on formulating a more precise sector requisition for auxiliary fleet delivery for the 13th Five-Year Plan. The collegium has given special instructions on this question to the Planning and Currency Finance Administration, the Main Administration of Shipping and Ship Repair Enterprises, and other subdivisions of the ministry, scientific research institutes and central planning and design offices, and steamship companies.

The sector has implemented the "Methodical Instructions for Developing Plans of Economic and Social Development of Maritime Transport," which have been sent out to all steamship companies, scientific research institutes, and central planning and design offices. The collegium particularly emphasized that they all should strictly follow the methodical instructions in formulating orders for port fleet vessels. By this we mean working up the requirements and submitting requisitions at all levels with appropriate substantiated calculations. This especially applies to requisitions of steamship lines to the ministry, since to date they have submitted practically no justification for the number of vessels requisitioned.

With regard to the references in the article concerning "scientific work to determine the optimum composition of port tugs" for the 12th Five-Year Plan, this work in the Leningrad Central Planning and Design Office is the first stage in transferring to computers calculations for determining the optimum types and amount of port tugs in accordance with methodical approaches set outlined in the methodical instructions. The program for developing an automated system of planning estimates in maritime transport in the 12th Five-Year Plan, approved by the collegium and ratified in 1985, calls for the development and introduction in an automated mode a number of complexes of tasks for the fleet's non-transport types.

The collegium instructed the V/O Morteckhsudoremprom and the base planning organizations of LTsPKB, RTsPKB, KTSPKB, and ChTsPKB to involve the steamship companies in examining projects of port fleet vessels and crafts planned to be built.

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## MARITIME AND RIVER FLEETS

### PLANS FOR MARITIME FLEET SHIPBUILDING IN 12TH FYP

Moscow VODNIY TRANSPORT in Russian 5 Jul 86 p 1

[Article by V. Posvezhinnyy: "The Fleet of the New Five-Year Plan"]

[Text] The first year of the 12th Five-Year Plan is proceeding throughout the country. Just what kind of replacements will the maritime fleet receive during these years? This question was answered for our correspondent at the Ministry of the Maritime Fleet (MMF) All-Union Association for Shipbuilding, Maintenance and Repair.

The fleet of the 12th Five-Year Plan, as in the past 11th Five-Year Plan, will be replenished with high-capacity universal multipurpose dry-cargo vessels, including those for active ice navigation, simultaneously integrating the properties of a bulk carrier and a container ship with vertical and horizontal methods of loading. Our shipping companies will receive container ships, transport barges, RO-RO ships, railway ferries, refrigerator ships, and also "ecologically clean" tankers.

With a somewhat decreasing overall tonnage of the fleet, its carrying capacity will increase through improving the structure and specialization of vessels and optimizing their technical and economic qualities.

The last two the multipurpose dry-cargo ships of project SA-15 (having a dead weight of 14,500 and 20,000 tons each) will be delivered this year and next year (by the "Valmet" firm in Finland); the "Astrakhan" series of vessels (with a dead weight of 18,000 tons each) being built in the GDR (Warnemunde) will be continued. A contract has been let for six more of these motor ships. In Greece, refrigerator ships having a capacity of 4-5,000 cubic meters each have been ordered, which will be delivered in 1988. The Baltic Shipping Company will receive two lumber ships, which have been ordered from the Malta shipbuilders.

The contingent of "Aleksey Kosygin" class of transport barges will be replenished with several more vessels by the end of the five-year plan. In 2 years the Murmansk Shipping Company will receive its first nuclear-powered Sevmorput active ice-navigation lighter-container barge.

The "Khariton Greku" class of bulk carriers (52.8 tons dead weight) will continue to be built at Nikolayev, but with a new engine. The "Khudozhnik Moor" class vessels (24,000 tons dead weight) are being built in Bulgaria.

A USSR-GDR ferry crossing will become operational during this five-year plan, for which German shipbuilders will deliver three double-deck railway ferries with a capacity of 103 cars each. The Caspian Sea Shipping Company will receive the last "Sovetskaya Nakhichevan" ferry from Yugoslavia. The Sakhalin Shipping Company will be replenished with the next "Sakhalin-9" and "Sakhalin-10" ice-class ferries.

Construction of the "Pobeda" (65,000 tons each) and "Aleksandr Nesterenko" (25,000 tons) classes of tankers will continue. New types of main propulsion plants will be installed on them.

The Baltic Shipyard will build one more nuclear-powered icebreaker of the "Arktika" and "Rossiya" type, and two nuclear-powered icebreakers of the "Taymyr" type (50,000 horsepower each) have been ordered from the Finnish shipbuilders for estuarine sections of Siberian rivers.

In 1987 the shipbuilders of Poland will deliver the first of the two "Druzhba" and "Mir" training sailing ships being built.

The state commission just accepted from the shipbuilders of Poland the passenger vessel "Mikhail Sholokhov," the next in the series of the "Dmitriy Shostakovich" type. It is destined for the Far Eastern Shipping Company.

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## MARITIME AND RIVER FLEETS

### SHIPBUILDING PROGRAM PLANNED FOR OB-IRTYSH BASIN

Moscow VODNIY TRANSPORT in Russian 21 Jun 86 p 2

[Article by A. Sereda, chief of the technical department of the Ob-Irtysh Combined River Steamship Line, Tyumen: "New Projects"]

[Text] At a session of the technical council of the Ob-Irtysh Combined River Steamship Line we discussed the progress in developing a comprehensive program for expanding shipbuilding at the line's industrial enterprises.

Participating in the session were representatives of planning organizations--L. Khrapov, chief engineer of the Central Design Bureau of the RSFSR Ministry of the River Fleet, and chief designers of its Novosibirsk branch, V. Zhukov and V. Volostnykh. The technical council examined new plans of vessels proposed by designers for small rivers, construction of which is scheduled in the 12th Five-Year Plan.

Construction of pushboat-tugs with a draft of less than 1 meter will begin for use in shipments over sectors of small rivers presently inaccessible for the transport fleet. The previously well-known paddle wheel engine was used in building a pushboat-tug having a draft of 40 centimeters. Original designs were also used in designing a pushboat having a draft of 70 centimeters and 300 horsepower. The vessel's hull was made sectional in order to eliminate the harmful effects of engine noise and vibration on the crew. There are plans to begin building dry-cargo motor ships having a 400-ton capacity and a draft of 1.3 meters. Unlike those currently being built in the steamship line, the new dry-cargo ship will be able to operate with a barge-attachment having up to a 300-ton capacity.

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## MARITIME AND RIVER FLEETS

### SHIP'S RADIO OPERATOR ON EQUIPMENT, WORKING CONDITIONS

Moscow MORSKOY FLOT in Russian No 5, May 86 p 31

[Article by A. Shabatin, chief radio officer of the tanker Iosip Broz Tito, Georgian Shipping Company, Honored Radio Operator of the USSR: "Radio, Moscow and the Journal MORSKOY FLOT"]

[Text] It is unfortunate that I have only just now read in MORSKOY FLOT, No 10, 1984, the article, "The Problems Must Be Solved." The questions raised by A. Kulinich, chief radio officer of the motorship Karl Libknekht, are very important. I wish to add that, since 1974, the radio navigational instruments and radar sets began to be put in charge of the chief radio officer, and after this the navigation staff had considerably less knowledge of the radar and the radar instruments. In addition, completely new equipment of Soviet and foreign make began to be placed on the vessels. The time spent in daily routine inspection and repair of the equipment increased proportionally.

With the slightest deviation in the work of the instruments, regardless of the time of day, the chief radio officer is immediately summoned to the bridge to eliminate the trouble rapidly. Formerly, when the equipment was in charge of the navigators, there could be no question of repairing it at night. This has now become a regulation.

I wish to give an example for comparison. The equipment which was installed in the radio room and is operated by radio specialists was hardly ever out of order in two years of work on the ship, even though there is considerably more of it in the radio room than on the bridge.

Recently, despite the orders to curtail communications, their volume has considerably increased, just as the quantity of information on navigation safety: NAVIP [written navigation warning], NAVIM [navigation information for mariners], NAVAREA [expansion unknown].

As a rule, the reception of these communications very rarely coincides with the time of the watch, since the radio operator has a normal work day, and the reception of all this information lies only with the chief radio officer. I agree with the opinion of A. Kulinich, that we must either pay for the constant processing by the chief radio officer or reduce his watch time.

The Ministry of the Maritime Fleet has not solved the problem of issuing special "milk" when the radio specialists are performing hazardous work--receiving facsimile prognostic charts and newspapers and servicing the batteries, which for its overall complexity takes at least four hours a day.

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## MARITIME AND RIVER FLEETS

### COMMERCIAL LOSSES ON BLACK SEA-CUBA SHIPPING LINE

Moscow MORSKOY FLOT in Russian No 5, May 86 pp 14-15

[Article by A. Gavrilov, chief of commercial service of the Black Sea Shipping Company: "We Are Cutting Down Commercial Losses"]

[Text] In the last few years the commercial results for the runs of vessels operating on the Black Sea-Cuba line have been justifiably criticized. In actuality, while the relative significance of the Cuban line in the work of the Black Sea Shipping Company was 10 percent with respect to tonnage and 14 percent with respect to cargo, its share in commercial losses reached 44 percent.

There were many reasons for the trouble, both objective and subjective. The difficulty here lay mainly in the fact that everything depended on the actions of numerous units taking part in the transport process--the crews of the ships, the cargo control division of Transflot, the loading port of Ilichevsk, the Cuban unloading port, the agent providing a count of the cargo on behalf of the ships' crews in Cuban ports, the representatives of the Sovfrakht All-Union Association in Havana, the foreign trade associations of the USSR Ministry of Foreign Trade--exporters of the cargo--and the Soyuzvneshttrans All-Union Association division in Ilichevsk. Each of these units sometimes exerts a decisive influence on the commercial results of the run of a specific ship. Suffice to say that with respect to individual runs the claims for cargo shortages were numbered not in thousands and not in tens of thousands, but exceeded 100,000 rubles. Moreover, the largest of them were connected, not even with counting the cargo, but with errors made in filling out the cargo documents. This was the case, for example, with the motorship Metallurg Anosov. Twenty packets of 12 boxes each were loaded on this vessel, and on the bill of lading, in the column for "number of spaces" they noted--240 spaces, i.e., the total number of boxes. The fact that they were made up into 20 packets was not mentioned. At the unloading port each packet was counted as one space, and in the final document it was noted: according to the bill of lading the number was 240 spaces, 20 spaces were unloaded and the shortage was 220 spaces.

As a result, the shipping company was presented with a claim for 168,000 rubles. Finding the guilty party proved to be not so simple. The port was guilty in that it entered incomplete data on the bill of lading, Transflot accepted and signed this bill of lading on behalf of the captain, the second mate did not

trace the correctness of filling out the tally books, the agents did not show due care and did not verify, according to the unloading documents, the number of spaces for this bill of lading, and the consignee, having actually received the entire cargo, did not pass up the legal opportunity to present a large claim for the nonexistent shortage.

The most numerous cases of cargo shortages, particularly large ones, occurred because the Soviet suppliers by no means always singled out, at each cargo space, the figures for the number of the Cuban contract, and this marking was often completely lacking on the cargoes. Without it, however, resorting is inevitable, and the cargoes are entered in the "without documents" category, which is equivalent to losing them.

In addition, if one speaks of the influence of the supplier plants on the shipping company's losses, one must not fail to mention their disinclination to packet cargoes such as wire and metals, and the use of tinlabels as markers, which are easily broken off during transshipment, and quickly rust when exposed to the atmosphere and lose all value as information bearers. As a result, such cargo also becomes documentless, since in the holds there are hundreds of spaces for goods, each of which must be turned over separately. How can this be done, though, without markers, how can it be proven that a cargo belongs to a precise given bill of lading consignment? Essentially, this is impossible. Only the corresponding foreign trade associations--the exporters of the goods--can exert any influence on the supplier. Our woes, however, are unfortunately not perceived as theirs, and they are not ashamed to recover large sums from us for the "loss" of cargoes for these reasons.

The loading port--Ilichevsk--plays no less a role, if not the main one, in forming the shipping company's losses in this direction.

Really, the commercial rejects often arise at the initial stage of the run. It must be said, however, that it is no easy matter to load, competently, onto a vessel 6-7000 tons of cargo from 700-800 separate consignments and indeed, so that each one is separated out and can be unloaded quickly and without a mix-up. All the more so, since the loading port bears no responsibility for the results of the unloading--from the moment the bill of lading is signed, the responsibility lies fully with the vessel.

The unloading port, on which the consignment unloading of the cargo depends, and its qualitative characteristics, counting and checking the actual quantity in case of discrepancies with the data from the bill of lading, etc., has no less influence on the commercial results of the runs. The technology agreed upon for the cargo work plays a decisive role here. In other words, the technology at the loading port should conform with the technical and technological potentials of the unloading port.

That is why we attributed great importance to the direct contacts of the long-shoremen at Ilichevsk with their colleagues at the main unloading port for general cargoes--Havana. In connection with this, an Ilichevsk docker brigade

was sent on one of the vessels on a run to Cuba, and they took part in unloading the cargoes that they had loaded and discussed the difficulties that really exist and ways of eliminating them. After this Ilichevsk invited the commercial director of the Cuban Port Union. Everything taken together, it had an influence on the quality of the vessel loading and cut down instances of cargo loss.

It must be said that the conference held in 1983 at Glavflot especially on this problem was a very important event setting the start to serious work on reducing commercial losses on the Cuban line. Interested shipping companies, Havana representatives of Morflot and directors of the main subdivisions of the Ministry of the Maritime Fleet took part in the conference. On the basis of the business analysis special measures were worked out, directed toward reducing the loss of cargoes during transshipments to Cuba.

The conference documents made it possible for the Black Sea Shipping Company, on the basis of the specific conditions of the fleet operation, to build their own interrelations both with the foreign trade associations of the Ministry of Foreign Trade and with the Cuban organizations, based on rigid requirements to fulfill their commitments. The refusal of the ship captains to receive cargo without Cuban marking, although it complicated relations with certain associations, who found themselves in a difficult position (disruption of the planned export supplies), shifted this problem from a dead issue, and it can now be said that it is solved. Of course, new compromise solutions had to be sought and found in order to give the possibility and time for the associations to have an effective influence on the supplier plants.

Because a number of industrial enterprises were not prepared to ship rolled wire and metals in packaged form, it was agreed with the Ministry of Foreign Trade associations to pack these cargoes temporarily at the port before loading, and to share the expenses. This measure sharply reduced, it may be said, almost eliminated the cargo shortages to which over half of all the losses had fallen.

In 1984 the shipping company, the Port of Ilichevsk and the office of the All-Union Soyuzvneshttrans confirmed additional measures to improve the processing of cargoes directed to Cuba. They specified a whole set of specific measures reflecting the complexity and specific nature of processing cargoes.

In addition, a delegation from the shipping company visited Havana, where further joint actions to avert cargo loss were agreed upon. In particular, they began containerizing small-batch cargoes. The Havana Port management set apart a special warehouse to separate the assembled containers (with the cargoes of several consignees) and practically removed the former restrictions. This made it possible for us to ship almost all the "small items" in containers. As a result, on the multi-purpose vessels the number of bill of lading consignments was sharply reduced--instead of 600-800 of them there were about 200, which to a decisive degree facilitated the crews of the multi-purpose vessels in the task of high-quality cargo turnover.

An agreement with the Cuban Port Union on conducting an experiment, in the course of which cargoes were unloaded from the vessels with strict bills of



loading and issuance of the final document after its completion, not several days later, as was specified by the agreement, exerted a great influence on reducing the cargo losses. At the same time, after each ship was unloaded, a detailed analysis of the quality of its loading at Ilichevsk was directed to the shipping company. These analyses made it possible for us to pass from general conversations on the shortages permitted by the port and Transflot in loading the vessels to the specific parties guilty of the commercial reject.

In considering the special characteristics of processing vessels with a large number of bill of lading consignments in Cuban ports, the tallymen of the agent firm are still insufficiently skilled, and also, in trying not to hold back the intensiveness of the cargo work by requiring unloading in accordance with bills of lading, which requires that each cargo space be identified by complex marking, which sometimes contains over 30 symbols, we decided, during the first six months of 1985, to help the tallymen for the agent in the Port of Havana to select a single ships tallyman for each industrial line. Payment for this dual tallyman position was assumed by Ingosstrakh and the London Mutual Insurance Club, equally as interested in reducing the losses due to cargo damage as the insurers. Some 26 vessels were run through according to this system. Seventeen runs were completed without missing goods, and on nine vessels negligible deviations were recorded. On the average the shortage per vessel was 8 spaces, whereas in 1982-1984 it was 83 spaces per vessel.

In other words, on the average for each vessel there was 15-19,000 rubles less of claims. This is not counting the effect from accelerating the processing of the ships due to averting time loss to determine the bill of lading ownership of each space. Representatives from the All-Union Sovfrakht Association in Havana played an important role in the success of the experiment and of other measures carried out in conjunction with Cuban organizations.

All the same, the main unit able to ensure the runs without commercial losses must of course be considered the ship's crew, which takes part in all phases of the transport conveying--loading, transshipping and turning over the cargo. Our experience shows quite tangibly that, even under the most difficult conditions for a run, if the crew is headed by a competent, energetic captain, capable of independently analyzing the sometimes complex situation of receiving and turning over the cargo and of making the correct decision, there can be no major blunders. To facilitate the ships' crews in fulfilling this task, we drew up requirements directed toward safe transshipment of the cargoes. Recommendations, obligatory in making the run to Cuba, in consideration of all the special features and specifics of this route, were set forth in detail in a special document. The idea is to make all the units participating in the transport process fulfill their commitments in a high-quality fashion. Only the captain, bearing the responsibility for the final commercial results of the run, can achieve this. The captain's nonfulfillment of the "recommendations" is revealed in investigating the reasons for damage to the cargo, when his actions to avert losses are evaluated. Introducing this innovation inevitably necessitated an improvement in producing the cargo documents, using a computer, and caused a change in the form and content of the cargo plans, a review of the system for counting cargo at the ports, etc.

All this purposeful work is impossible without raising the level of checking up on the execution. A constantly operating monitoring system has been introduced at the shipping company--once a week there is a review of the state of affairs with the chief of commercial service, once a month an analysis of the quality of the loading of vessels of the Cuban route with the deputy chief of the Port of Illichevsk, with the participation of representatives of the interested organizations, and once a quarter the problems of the Cuban route are examined either at the shipping company council or at the "day of quality" with the chief of the shipping company or at a conference with its first deputy.

The measures taken by us could not help but reflect the level of commercial losses in transshipping cargoes on the given route. Suffice to say that the totals of claims paid for damaged cargoes were reduced in the five-year period from 624,000 to 100-120,000 rubles, i.e., by a factor of over five.

We cannot yet say that the goal has been reached and all the problems solved. Our experience speaks only of the fact that with the good will of all parties, the joint, painstaking work must necessarily lead to reducing the losses from poor maintenance of the cargoes.

In our opinion, chief among the unsolved problems is a definitive agreement at the corresponding level of the question of documentless and excess cargoes revealed in unloading the soviet vessels at the Cuban ports; raising the quality of counting the cargo at the ports of both countries; packing of small cargoes (wire, rolled wire, metal) by the supplier-plants; improving the marking of the cargoes; issuing a final document at the Cuban ports, confirming the amount of cargo unloaded after the unloading is completed, regardless of the number of bill of lading consignments, before the vessel departs.

Solving these and other problems depends not only on us, We expect assistance from the central apparatus of the Ministry of the Maritime Fleet and other ministries and departments taking part in the transport process.

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## MARITIME AND RIVER FLEETS

### LP-102 AIR CUSHION ICEBREAKING ATTACHMENT DETAILED

Moscow RECHNOY TRANSPORT in Russian No 4, Apr 86 pp 37-38

[Article by V. Zuyev, V. Govorkov, S. Mastryukov, Yu. Smirnov, and A. Ryabinkin: "Air Cushion Icebreaking Attachment"]

[Text] Air cushion icebreaking attachments (LPVP) are attracting more and more attention as a means of breaking up ice and creating a navigation channel. They can be operated in conjunction with icebreakers, pushboats, or transport vessels adapted for navigation in ice blocks.

The advantage of this method of breaking up ice over traditional methods is a substantial reduction in energy costs and operational expenditures which reach significant amounts for river vessels. Thus, when icebreakers navigate in ice of maximum thickness, up to 80 percent of the propulsion plant's power is spent on breaking up the ice cover and on the hull's friction against the edge of the ice. The additional resistance results in lower speeds of the vessels, which often do not exceed 2 km per hour.

Ice is broken up by air cushion vessels provided that the amount of pressure created in it exceeds the ice thickness. In this case, an air space forms under the ice cover, as a result of which, given its specific dimensions on the plane, the ice breaks up under the effect of its own weight. Energy expenditures here are not great, and resistance does not increase because the hull does not contact the ice. Under these conditions it is possible to achieve increased speeds in breaking up the ice, which are determined by the power capabilities of the pushing vessel. The cost of building and operating an LPVP is relatively low.

The LP-102 experimental air cushion amphibious icebreaking attachment was designed at the Gorkiy Polytechnical Institute imeni A.A. Zhdanov on instructions from the Central Scientific Research Institute of the Maritime Fleet.

The LP-102 attachment is single-deck vessel that is not self-propelled, whose steel hull is divided into 26 sections and has a square shape. It has a transverse framing system with a spacing of 400 mm. The lifting system includes a gas reaction turbine, an ejector, and an air duct. It has a chamber system for forming a cushion of an air-gas mixture and air.

### Technical Data on the LP-102 Attachment

Hull length, meters. . . . .	13.6
Hull design beam, meters . . . . .	20
Hull height, meters. . . . .	1.5
Height of flexible skirt, meters . . . . .	1.5
Weight, tons:	
empty . . . . .	72
with ballast. . . . .	220
Power consumption of lifting system, . . .	550

It has the capability of changing the weight of the vessel during experimental research by taking on liquid ballast into the compartments. There is a DGR-25/1500 diesel generator for supplying electrical power to the ballast system and also for heating and lighting. The gas turbine is started remotely from the deck house where the instruments and control panel are located.

The flexible cushion skirt is simple in structure and consists of easily removable hinged sectional elements made of rubberized cord fabric.

The turbine and ejector provide an air flow of 40-60 cubic meters per second and an excess pressure of up to 10 kPa in the air cushion.



The LP-102 attachment on a towing rope in ice 0.8 meters thick.

Testing of the LP-102 attachment was done at the Gorkiy Reservoir covered with ice 0.6-0.85 meters thick with a bending strength of 0.6 MPa.

In the first phase of the testing, the attachment was moved by means of a capstan and anchors at a speed of 0.2-0.3 meters per second over an artificially created pile of ice blocks frozen together with a total thickness (including the ice cover) of up to 1.5 meters, which was broken up in a strip

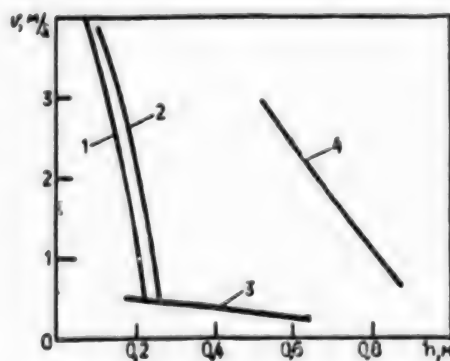
20-22 meters wide. The slow speed was caused by the rotational speed of the capstan drum.

Type of Vessel	h, m	B, m	v, km/hr	N, kW	K, $\frac{\text{kW}}{\text{m}^3/\text{s}}$	Operating costs, rubles/day
Project 16 icebreaker	0.35	14.5	2	1,330	468	970
Project R-47 icebreaker	0.27	9	2	450	330	620
"Kapitan Chechkin" type icebreaker	0.7	19.5	2	4,600	618	3,000
	0.5	19.5	5.8	4,600	293	3,000
"Ozernyy-206" icebreaker tug	0.2	11	2	1,050	852	680
"Ozernyy-206" and LP-102	0.8	22	5	1,600	65	800

In the second phase, the attachment traveled in a solid ice field with the icebreaker tug "Ozernyy-206" (project II-3180) having 1,030 kW output and a hull 46.3 meters long, 9.2 meters wide, and with a draft of 2.4 meters.

The assembly traveled at a speed of up to 8 km per hour, continuously breaking up the ice cover. However, every 70-100 meters the tug's propeller shroud became clogged with chunks of ice, which made it necessary to stop and reverse propellers. As a result, the average speed decreased. A channel 20-33 meters wide formed behind the unit, covered with broken up ice with a compactness of 7-8 points. In doing this, the tug's engines operated at less than full power—their rotational speed corresponded to two-thirds speed.

Under such ice conditions, "Ozernyy" series tugs can travel independently at a speed of not more than 0.25-0.27 km per hour, breaking up the ice cover by running into it and forming a channel 13 meters wide, with the compactness of the broken up ice being 10 points.



Plots of "Ozernyy-206" tug's navigability in ice: 1-continuous movement; 2-with power increased to 1,600 kW (recalculation); 3-moving in surges; 4-with LP-102 attachment.



Thus, requiring approximately one-half the power of a tug for forming an air cushion and creating a navigation channel 1.6-fold wider, the LPVP made it possible to increase the speed of clearing a channel 10- to 20-fold. If this power is passed on to the tug's propellers, its speed in ice will increase by not more than 20 percent.



Tug with attachment underway.

It must be noted that the "Ozernyy-206" tug's characteristics and design do not correspond to the requirements set forth for an LPVP pushboat. When operating with an optimum vessel, the efficiency of the LPVP will be higher.

The tests showed good maneuvering qualities of the tug and attachment, which traveled in a turning circle path of about 106 meters.

The following criterion may be used to compare the efficiency of breaking the ice cover by icebreakers, vessels using the icebreaker attachment, and other similar equipment:

$$K = \frac{N}{B, v} \left[ \frac{\text{kW}}{\text{m/s}} \right],$$

where  $N$  is the power consumption in kW;  $h$  is the thickness of the ice in meters;  $B$  is the width of the channel in meters; and  $v$  is the speed in meters per second.

This value is the power consumption for breaking up a unit of ice volume in a unit of time.

Some calculated data characterizing the efficiency of different icebreaking vehicles are given in the table. Information on the operational indices and testing results of the vessels were used for the calculations.

The efficiency of icebreaking by air cushion vessels gives grounds to assume that they will find use as new technical means for extending navigation.

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## MARITIME AND RIVER FLEETS

### BRIEFS

**RIVER PASSENGER SHIP LENIN LAUNCHED**—The jubilee 35th river passenger ship of a new series intended for the Soviet Union has been launched from the building slips of the shipyard at Boitzenberg (GDR). This ship, rightfully called a "floating hotel," has been given the name "Lenin." The ship will become the flagship of the Russian Federation's river fleet. Since the shipyard began operation, the shipbuilders of Boitzenberg have delivered to the Soviet Union more than 350 ships of various purpose. The enterprise's work is characterized by continuous desire to update their output. Already this year the shipbuilders have pledged to begin series production of a new type of passenger ship. [Text] [Moscow VODNYI TRANSPORT in Russian 3 Jun 86 p 1] 12567

**LO/RO SVERDLOVSK LAUNCHED**—Leningrad—The USSR state flag has been raised on the cargo ship "Sverdlovsk," built on order for the Soviet Union at the shipyard in the city of Warnemunde (GDR). The "Sverdlovsk" will become the sixth LO/RO vessel in the Baltic Shipping Company. Operation of vessels of this series for 2 years has proven their high operating efficiency. En route from the shipyard to the port of registry, the ship will take on about 4,000 tons of large-diameter pipe in Bremen for cross-country gas pipelines. Then in Leningrad it will take on cargo headed for Cuba and depart for the island of liberty. [By VODNYI TRANSPORT correspondent] [Text] [Moscow VODNYI TRANSPORT in Russian 5 Jun 86 p 1] 12567

**IRTYSH RIVER CHANNEL DREDGING**—Semipalatinsk (TASS)—The menacing Lopatinskiy Shoal has become safe for river transport workers. Specialists of the Upper Irtysh Basin Administration of Waterways completed work on dredging a 5-km section of the waterway in nearly half the planned time. Navigation today is proceeding smoothly with the workers of the main river waterway. In a short period of time they have dredged the Zhanasemeyskiy, Vetlovo-Karevskiy, and Adilkayevskiy shoals. [Text] [Moscow VODNYI TRANSPORT in Russian 5 Jun 86 p 1] 12567

TANKER ALESHA DZHAPARIDZE OPERATIONAL--Baku (TASS)--The tanker "Alesha Dzhaparidze," an addition to the Caspian Sea Shipping Company, departed on its first voyage with a cargo of petroleum products on board. Built by shipbuilders of Romania, the vessel has a capacity of more than 6,000 tons and is equipped with the most modern navigation and environmental protection systems. The tanker "Alesha Dzhaparidze" is the fifth tanker built by the Romanian shipbuilders on order for the Caspian Sea Shipping Company. [Text] [Moscow VODNYI TRANSPORT in Russian 5 Jun 86 p 1] 12567

USSR-PRC SHIPPING AGREEMENT--As a result of negotiations between a delegation from the All-Union Association Sovfrakht of the USSR Ministry of the Maritime Fleet and representatives of the PRC Ministry of Communications, an agreement has been signed which provides for further expansion of cooperation of the two countries in the area of shipping. In accordance with this agreement, agencies will be set up on a long-term basis for Soviet vessels and vessels chartered by the all-union association. This agreement is expected to help speed up the processing of Soviet ships at Chinese ports and increase the volume of shipments by sea between the two countries. Documents were also exchanged for plans this year to open a representative office of Soviet shipping companies in Shanghai and a representative office of Chinese shipping companies in Odessa. [Text] [Moscow VODNYI TRANSPORT in Russian 20 Jun 86 p 1] 12567

JOINT SOVIET-INDIAN CONTAINER LINE--Ilichevsk (TASS)--Having taken up a course from Ilichevsk to Bombay, the Indian motor ship "State of Haryana" opened the joint Soviet-Indian container line from the Black Sea to ports of India. Now the majority of cargo being shipped via the revitalized commercial shipping line will be delivered in containers convenient for handling and storage. Container handling is mechanized, which will make it possible to speed up their delivery. Indian and Soviet container ships will operate strictly according to schedule. Introduction of this advanced form of shipping will increase the intensity of fleet operation considerably. [Text] [Moscow VODNYI TRANSPORT in Russian 21 Jun 86 p 1] 12567

NAKHODKA INMARSAT INSTALLATION--Nakhodka--The country's second International Maritime Satellite Communications Center (TsMSS) INMARSAT has begun commercial operation in the port city of Nakhodka. Now more than ten international TsMSS's carry out shore-satellite-ship and the reverse communications, including two in the USSR--at Odessa and Nakhodka. With the aid of electronic switchboards it is possible from aboard a vessel to be linked up in a matter of minutes with the necessary installation located many thousands of nautical miles away. [By N. Filippetskiy] [Text] [Moscow VODNYI TRANSPORT in Russian 26 Jun 86 p 1] 12567

PIM, BOLSHOY BALYK RIVER SHIPPING--River transport workers of the Ob-Irtysh Shipping Company have begun opening up two previously nonnavigable rivers--the Pim and the Bolshoy Balyk. The first consignment of cargo was delivered over the Pim for the Lyantorskiy oil fields by crews of the tugs RT-405 from the Tyumen Shipyard and BT-302 from the Surgut Maintenance and Operation Base. They were assisted by 150 tugboat workers of the Sverdlovskiy Rayon Administration. All shipments over the Bolshoy Balyk are accomplished by vessels registered to the Nefteyugansk Pier of the Surgut port. [By VODNYY TRANSPORT correspondent] [Text] [Moscow VODNYY TRANSPORT in Russian 26 Jun 86 p 1] 12567

NEW CASPIAN RAIL FERRY--Baku (TASS)--The ferry "Sovetskaya Belorussiya" has been added to the fleet of the Caspian Sea Shipping Company. Built at the shipyard of the Yugoslav city of Pula, it can carry 28 rail cars and several hundred motor vehicles. [By VODNYY TRANSPORT correspondent] [Text] [Moscow VODNYY TRANSPORT in Russian 1 Jul 86 p 1] 12567

NEW LATVIAN REEFER BELGOROD--Riga (TASS)--The refrigerator ship "Belgorod" has been added to the fleet of the Latvian Shipping Company. The vessel, built by the shipbuilders of Poland, can carry more than 3,000 tons of cargo. Automatic systems maintain the necessary temperature conditions which will ensure good preservation of perishable cargo during voyages. The new ship will run between European and South American ports. [Text] [Moscow VODNYY TRANSPORT in Russian 31 Jul 86 p 1] 12567

SEYAKHA RIVER SHIPPING PROPOSED--Omsk (TASS)--The crew of the ship "Porog" of the Salekhard Technical Section has begun exploring a navigable route on the far northern river of Seyakha, which empties into Obskaya Guba. The Seyakha is the shortest and most economical route to the northern fields of Yamal. In order to speed up delivery of cargo over the previously nonnavigable small river, the collective of the Irtysh Basin Administration of Waterways has a tremendous amount of dredging work to do here. [By VODNYY TRANSPORT correspondent] [Text] [Moscow VODNYY TRANSPORT in Russian 31 Jul 86 p 1] 12567

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## PORTS AND TRANSSHIPMENT CENTERS

### GOSSNAB VIEWS INTERMINISTRY COORDINATION IN YAKUT ASSR PORTS

Moscow VODNYI TRANSPORT in Russian 20 Jun 86 p 2

[Article by V. Mikhaylov, deputy chief of the USSR Gossnab Administration: "On-Time Freight for the North!"]

[Text] It was noted at the June (1986) CPSU Central Committee Plenum that now the achievement of dynamic rates of development of the economy, high efficiency indicators, and positive changes in the social sphere are becoming the main criterion of assessments. Resolution of these tasks also depends on the transport workers and the qualitative and timely delivery of freight and people to their destination, including to northern areas.

The USSR Gossnab is devoting special attention to improving the planning and organization of freight shipments to Yakut ASSR, northern areas of Irkutsk Oblast, the Arctic, and Chukotka and to completing the transition to the shipment of goods in containers and in packaged form (except for individual types of products).

The Osetrovo river port of the Lena Shipping Company, as we know, performs a large volume of work on unloading rail cars and loading ships; therefore, it is not by chance that considerable resources in the last two five-year plans have been directed at its development and modernization. Old freight areas have been modernized and new ones constructed, including a container terminal for processing large-capacity containers. The length of the mooring wall and the open storage areas have nearly doubled; transfer equipment has been updated; and new machines and mechanisms are being allocated. The port has been replenished with highly qualified cadres of engineering specialists. In short, all the necessary material and technical and other conditions are there to fulfill the set goal for shipment of dry cargo in 1986, which is . percent higher than last year.

At the same time, the structure of freight traffic has improved in the last 2-3 years. The bulk of the freight (90 percent) comes to the port in containers, in packaged form, and also as large crates from the suppliers, which makes it possible to reload them by a mechanized method. The USSR

Gossnab is making priority allocations of the necessary amount of soft containers, strapping tape, pallets, and other packing equipment to the ministries and departments for this. The Osetrovo port has been allocated the necessary amount of rolled wire for forming freight into enlarged shipping units--block-packs. The Ministry of Railways has improved the supply of containers significantly, especially large-capacity ones.

At sessions of the operations group for the Far North in the USSR Gossnab, they regularly discuss and resolve interdepartmental problems related to ensuring freight deliveries and shipments, allocation of containers and packaging. As a result, in 5 months of this year, compared to last year, the arrival of freight in medium-capacity containers increased by 20 percent, in large-capacity containers it doubled, increased 1.4-fold in special containers, and in consigner packaging increased 1.7-fold. The increased goal set at the request of the RSFSR Ministry of the River Fleet of early accumulation of 150,000 tons of freight in containers was also met, which was nearly 30 percent more than last year's goal.

In accordance with the USSR Gossnab goal, prior to the start of navigation ministry-consigners, the Ministry of Railways, and the RSFSR Ministry of the River Fleet accumulated considerably more of the most labor-intensive large-tonnage freight at Osetrovo port than last year. This primarily is meal and mixed feed delivered in bags in covered rail cars, cement, and food and industrial goods. They arrived at the port practically completely in straps, in heat-shrinkable film, and on pallets and were prepared here for shipment on ships as enlarged block-packs. If such an accumulation of, say, meal and mixed feed had not been made, in June and July the norm for unloading would have had to have been increased by an average of 60-70 rail cars per day.

These tangible measures helped to improve the unloading of rail cars by the port in April and May without increasing and even with a reduction of the number of workers on loading and unloading operations. Compared to last year, 35 percent more rail cars were unloaded in April and 37 percent more in May; the average daily unloading compared to the goal for May increased by 8 percent. It must be noted that the number of the most labor-intensive covered rail cars arriving at the port has decreased from 39 to 30 percent of the total amount of rail car traffic.

However, it is too early to be content with the results that have been achieved. In June the port had still not fulfilled the set norm of unloading, and in the first 10 days the unloading of rail cars even fell somewhat; they have not been provided with the sufficient amount of manpower. But the main thing is that not much tonnage is being supplied for freight shipments, especially in containers, and reloading directly from rail car to ship has decreased. For this reason the plan for dry-cargo shipments was not fulfilled in May.

It should be noted that on the railway network supervision of freight shipments from stations through Osetrovo port strictly according to the centralized plan has weakened, as a result of which unplanned goods are shipped and arrive at Lena Station. Due to the poor unloading of rail cars in June and also for the abovementioned reasons, many rail cars are backed up at

the Bratsk branch. As a result, the Gossnab was forced to concur with a temporary halt to freight shipments over the road network to Osetrovo, other than goods in containers and foodstuffs.

What must be done to improve the state of affairs? To what shortcomings should we turn our attention?

It has already been noted in the press, including in an article by the chief of the Osetrovo port G. Khoroshilov ("Don't Let Down Your Partner," VODNIY TRANSPORT, 24 May 86), how important containerization and packaging of freight are. There is still much to be done here.

The RSFSR State Agro-industrial Committee, the USSR Ministry of the Construction Materials Industry, the RSFSR Ministry of Grain Products, the USSR Ministry of the Chemical Industry, the Ministry of the Automotive Industry, and a number of other ministries and departments in violation of the government's resolution, continue to ship in unpackaged form as individual small lots fruit and vegetable canned goods, earthenware, and certain other building products, and also partially sugar, salt, motor vehicle tires, and spare parts. As a result, about 11 percent of the package and piece freight comes to the port as individual lots and is packaged there. The RSFSR Ministry of Grain Products is slowly resolving problems of packaging groats, grain fodder and special grades of meal; and the USSR Ministry of the Construction Materials Industry--problems of shipping special types of cement. The USSR Gossnab is forced to authorize exceptions for shipping 5 percent of the freight unpackaged.

Instead of taking effective measures for shipping products to areas of the Far North in packaged form and in special containers, certain ministries, for example, the RSFSR Ministry of Trade, the RSFSR State Agroindustrial Committee, and the USSR Ministry of Ferrous Metallurgy, request the USSR Gossnab to authorize them to ship them in individual lots, which naturally was denied. These ministries should take decisive measures to ensure fulfillment of the quotas within the prescribed time and reduce considerably the number of mixed-goods cars with small consignments.

However, resolution of the problem of containerization and packaging depends to a considerable extent on the Lena river transport workers, consignees, and management agencies of Yakut ASSR. Thus, increasing the amount of freight shipments in containers requires the shipping company to resolve appropriately the problem of returning the containers to the rail transport, especially medium-capacity containers of the Ministry of Railways, which are always in short supply on all of the country's railroads. So far the Lena Shipping Company and local agencies of Yakut ASSR are doing little to solve this problem. Of the 110,000 medium-capacity containers of the Ministry of Railways transferred to the Osetrovo port in 1985, more than 35,000 (32 percent) were not returned by the end of the navigation season and spent the winter in the basin; whereas in 1974-1975 the port's indebtedness to the railroad did not exceed 8-10 percent.

The lack of a system of material responsibility between the river transport workers and the rail transport workers for transferring and returning



containers also has an effect. The temporary 1963 agreement on this issue is no longer in effect, and coordination and approval of a new document drawn up by specialists of the port and the railroad have been delayed in the Ministry of Railways and the RSFSR Ministry of the River Fleet.

The slow shipment of freight containers from the port also attracts attention. On 10 June there were 33,000 medium-capacity containers located here; this is 1.6-fold more than last year. It is necessary to step up sharply the fleet's flow of shipping out containers, otherwise the mistakes of past navigation seasons may be repeated--freezing freight in containers and at port wharves and not return them to their points of origin.

The Lena Shipping Company is slowly solving problems of developing points for receiving large-capacity containers. In recent years only one point has been added to those in operation. This is clearly insufficient, since containerized transshipment will be expanded primarily through the use of large-capacity containers. The situation is the same for the development of medium-capacity container receiving points. Only 28 of the 100 arrival points in the Lena basin are working with these containers. Such major points as Tiksi, Nizhneyansk, Kuyga, and Kular up to now remain closed to direct mixed traffic for receiving large-capacity containers.

The delivery of freight in packaged form requires port workers and consignees to prepare appropriately to receive it. The Osetrovo port workers recently received the necessary electric loaders and lift trucks and are going over to enlarging packs into block-packs. Consignees in turn are obligated to prepare to receive freight in packs and block-packs. For this purpose, it is necessary for enterprises of the Yakut Main Administration for Material-Technical Supply, the USSR Ministry of Ferrous Metallurgy, and others to have the necessary park of pallets and appropriate lifting equipment and machinery. Special attention must be given to storing cement in heat-shrinkable film, mineral fertilizers in soft expendable containers, and other freight.

In turn, the USSR Ministry of the Construction Materials Industry and enterprises of the RSFSR Ministry of Grain Products must increase the quality of packaging of cement in heat-shrinkable film (improve sizing of bags and prevent overheating of the film), meal, and mixed feed.

Under conditions of the Lena-Osetrovo transshipment center's insufficient capacity of passage, including due to low water level of the Upper Lena, delivery of freight to Yana, Tiksi and points on the Lena via the northern sea route becomes increasingly important.

Despite the high rates and complexities for maritime transport for providing these additional shipments, the USSR Gossnab is forced to increase them every year.

During last year's navigation season, twice as much dry-cargo was shipped to Yana, Yakutsk, and Lensk via the northern sea route than in 1984. Unfortunately, part of the large-tonnage freight (cement, grain fodder, and certain others) was delivered by maritime vessels for transshipment to Tiksi in unpackaged form.

Completing preparations for the Arctic navigation season, which with the help of the icebreaker fleet will begin considerably earlier than last year, the consignees, rail transport workers and seamen should take steps for a complete transition to shipping this and other freight in containers and in packaged form. This primarily applies to enterprises of the Ministry of Fertilizers, the USSR Ministry of Trade, the RSFSR State Agroindustrial Committee, and the USSR Ministry of the Construction Materials Industry.

In our view, implementation of all these measures will make it possible to improve the operation of the Lena-Osetrovo and Tiksi transshipment centers for delivering the necessary freight to Yakut ASSR and northern areas of Irkutsk Oblast. However, freight traffic to these areas will increase quickly and further, and one can hardly expect a the workload intensity to decrease in the coming years at the transshipment centers.

Under these conditions, planning agencies of Yakut ASSR and Irkutsk Oblast should pay special attention to unsatisfactory development in locations producing parts of standard buildings, bricks, gypsum, cement, precast reinforced concrete, mineral slab, glass containers, and certain other types of freight, the production of which needs to be developed or organized based on local resources.

Thus, each year the shipments of potatoes through the Osetrovo port increase, although in previous years Yakut ASSR decreased these amounts by using local resources. Experts estimate that about 200,000 tons of such are accumulating, which could be produced locally instead of shipped in. The RSFSR Ministry of Grain Products should give some thought to setting up milling and mixed feed enterprises at Ust-Kut or Irkutsk in the near future.

As we see it, the various ministries and departments are faced with great and complex tasks for supplying the northern areas with everything necessary as completely as possible. In order to fulfill these tasks, each must do his part of the work in a qualitative and timely manner and not let his partners down.

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## PORTS AND TRANSSHIPMENT CENTERS

### BRIEFS

AFGHAN RIVER PORT EXPANSION--At the Afghan border port of (Khayraton), the second phase of a major transshipment base has been turned over for operation--warehouses, covered platforms, the rail base, (Khayraton) Station buildings, and other facilities. Construction of this key transshipment center of Afghanistan is being done with technical assistance from the Soviet Union. The beginning of the development of (Khayraton) was set with the commissioning of the motor vehicle and railway "bridge of friendship" across the Amu Darya. Now the port will be able to increase the processing of freight considerably--equipment, foodstuffs, fuel, and other essential goods. Khairaton has a great future. Before one's eyes this small populated area has been turned into a major transshipment center. The five-year plan of social and economic development of the Democratic Republic of Afghanistan (1986-1990) calls for further expanding its operation. [Text] [Moscow VODNYI TRANSPORT in Russian 24 Jun 86 p 1] 12567

KLAYPEDA-MUKRAN RAIL FERRY TESTING--The lead ferry "Mukran," making a trial run on the ferry crossing being built between the USSR and the GDR, arrived at Klaypeda Port. This is the first of six vessels which will operate on a regular line between the ports of Klaipeda and Mukran. One of the tasks of the joint testing being conducted is to ensure the precise link-up of coupling devices of the ships and the ferry bridge. Using technology developed by Soviet specialists in cooperation with colleagues from the GDR, rail cars will be wheeled on and off three times as fast as at the Ilichevsk-Varna crossing now in operation. With the ferry method of transshipment, there is no need to reload the cars proceeding directly as intended. This will reduce freight delivery time and, moreover, will ease the workload of the railroad, since a considerable portion of the goods will go by sea when the new crossing becomes operational. Regular traffic between the ports of Klaipeda and Mukran will open in early October and is timed to coincide with the USSR Constitution Day and a national holiday in the GDR--the day the republic was formed. [By V. Mertsalov] [Text] [Moscow VODNYI TRANSPORT in Russian 24 Jul 86 p 1] 12567

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## EXPERIMENTAL SYSTEMS

### SOVIET MAGLEV RESEARCH PROJECT EXAMINED

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 8, 22 Apr-5 May 86 p 8

[Article by Ye. Minin: "The Magnetoplane Is Ready to Start"]

[Text] The 20th century has given birth to megalopolises --cities that have spread for dozens of kilometers. The suburbs have also become involved in the work of industrial and scientific centers. Transportation in such cities is becoming a more and more acute problem. Its solution lies in creating new transport means and systems.

The scientists and engineers of the entire world are searching for an alternative to the wheel which has already become a brake and they are creating bold and unusual designs. That which yesterday seemed a fantasy is often today an everyday engineering work. Such is the fate of our native magnetoplane-- a fundamentally new transportation means. Today, the first meters of its running on a testing ground are on its "speedometer".

... We climb aboard the magnetoplane using a ladder similar to an airplane's. We occupy comfortable armchairs. Over our heads, the "Fasten Seat Belts" sign lights up. The door closes softly, an almost inaudible sound, a swift running start-- and here we are already flying over the city blanketed with morning haze. True, we are flying over ... rails at a height of only 10 millimeters; however, the rails themselves have been laid on a trestle rather high above the earth. That is why the sense of flying is complete and -- in almost complete silence. Outside the window, hills and distant mountain tops sweep past as if in a silent movie....

Everything, which was related above, is still only in the future. Anatoliy Pavlovich Chemodurov, one of the designers of the magnetoplane and laboratory chief in VNIIPITransprogress [All-Union Research and Development Institute for Advanced Transportation Equipment], talked about the prospects for this new type of transportation -- the transportation of the 21st century.

However, its experimental development has already been begun during the current five-year plan under the conditions of the first phase of the future 3.2-kilometer long passenger route from Yerevan to Abovyan.

The experimental model, which was shown to us at the VNIIPtransprogress testing ground in the city of Ramenskoye near Moscow, is not the collective's first work in this direction. At first, a device was built that closely resembled a standard subway car in which permanent magnets "worked". Now, the lift is electromagnetic. Then, there was the repulsion of the magnets from the rails; here -- attraction.

In cross-section, the rails are half of a pipe open below for a magnet that is connected with the travelling bogie. This design insures not only the lifting of the bogie but also its stabilization in a transverse direction.

The suspension network is mounted so that the bogie itself rises up when attracted to the rails. Variable-induction pickups set the optimum lift and a control system maintains it with the help of a computer. The right and left supports are connected by a rigid frame and form a single carrying module for a car. All told, there are six of these modules.

The design of the individual bogie module is being worked out along with the car. Aleksandr Viktorovich Cherevatyy, senior scientific associate, and Nikolay Vladimirovich Kozlov, chief of the group, demonstrated it in operation. It seemed a miracle that the bogie with a weight of almost two tons could rise from its position and move along rails with the force... of one finger. An electromagnetic field moves the car horizontally. The operating principle of a linear, three-phase asynchronous engine is used.

When one's first acquaintance is made with the magnetoplane, you automatically inquire about its ability to compete with presently existing types of transportation such as the subway, street cars, buses, and electric trains. It is as if Yuriy Dmitriyevich Sokolov, the director of the work, is waiting for this question....

Transport services are not keeping pace with the increase in the number of the urban population. Moreover, cities are expanding. The extent of several cities (Krivoy Rog, Volgograd, etc.) has already reached 100 kilometers and more today. In many respects, street cars, trollies and buses have already exhausted their capabilities. The increased movement intensity has led to a sharp fall in the speed with which passengers are transported, and the non-productive expenditure of time, which is spent by people on trips in a city, has increased. Even the subway with its high carrying capacity, which reaches 40,000-60,000 passengers an hour, has already approached its limit. It is advisable to construct them only in cities with a population exceeding a million. The closest competitor to the subway in carrying capacity is the high-speed street car, but it carries no more than 15,000 passengers an hour. The wheel, which has served mankind faithfully and reliably for many centuries, holds it back.

Another aspect of the problem is the ecological. Noise from transportation reaches 120 decibels in a city, and this is close to the limit which an individual can stand.

A social and economic analysis confirms transport's valid right to fill the "transport and social niche" that has arisen between the high-speed street car and the subway. Let us also add this argument: The new type of transport, which is mounted on trestles, forms a second tier of passenger traffic and will not interfere with normal surface traffic.

Incidentally, even cities, which have subway systems or are planning their construction, would have no objections to building routes for a magnetoplane for themselves. Economic and ecological aspects, especially in areas with a rugged landscape and hard soil, play the main role in making such decisions.

Cities are growing and involve the inhabitants of suburbs out to a radius of hundreds of kilometers in their life. Today, the main type of suburban transport is the electric train, but its speed is not great and the inhabitants of -- for example -- Zagorsk or Zvenigorod near Moscow must spend more than one and a half hours on the road one way. A magnetoplane will spend about a half hour on that same road. While doing this, the comfort of the passengers will be incomparably higher in it than in an electric train.

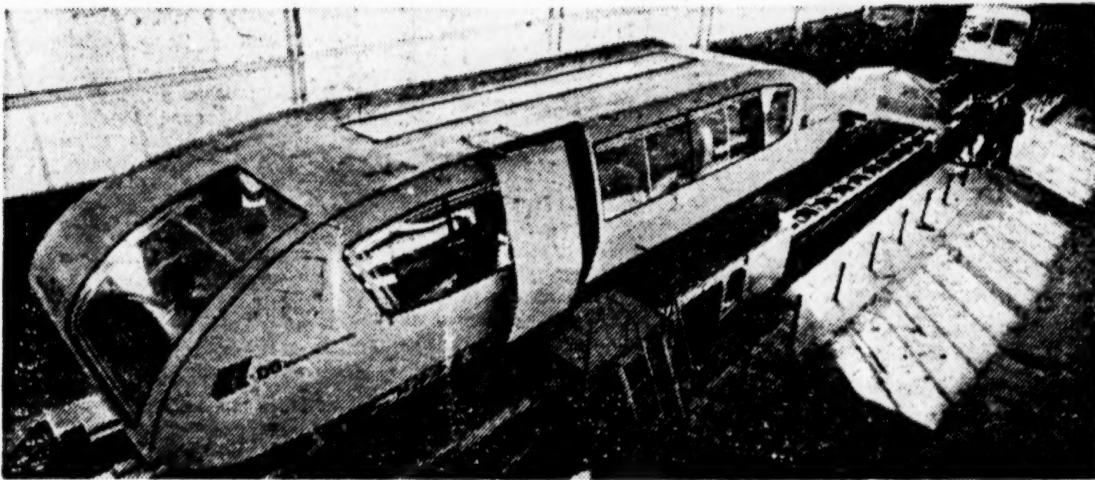
Who does not know that airplane passengers spend more time on the ground getting to and from airports than in the air? This is an example of the possible use of the magnetoplane -- to deliver passengers to an airport and return them. Moving with a cruising speed of 180 kilometers per hour (and possibly even 250 kilometers per hour), this transport system brings the surface rate closer to the air one. Moreover, an opinion exists that when a magnetoplane enters a city it can "dive" into a subway tunnel, deliver passengers to the central airport station, load others and continue its automatic journey to another airport.

Another area of application depends on the complete ecological purity of the new transportation system.

A few words about today's work without which this optimistic future will not occur. The laboratory's small collective has developed, assembled and equipped with devices and is completing the adjustment of the magnetoplane's complicated mechanical and electronic systems with enormous enthusiasm. Here is the experimental model which is ready for its first launching on the testing ground's 600-meter track.

Today, however, a task, which is more complicated and critical -- namely the building of an industrial model of the magnetoplane, is on the agenda. Its solution is only within the capabilities of a powerful design engineering collective that unites in its ranks the most diverse specialists -- mechanics, electronic technicians, material specialists, industrial engineers, mathematicians, economists, ergonomist specialists, and industrial designers.





A complete understanding of the situation and the solving of organizational and management problems are now required. Who will design and build it? Who will be the customer? In general, what will be the place of magnetoplanes in the country's unified transportation complex in the future?

Foreign experience also testifies to the need for a combined approach to the solving of the problem of transportation in the future. For example, the FRG has organized the Transrapid-EMS consortium for building industrial models. It includes seven large firms headed by Messerschmitt and Siemens. England, Japan and other countries are also performing serious work. By the way, the situation is a peculiar one in the United States: The attraction of the automobile wheel for Americans is too great. Even there, however, the situation should sharply change -- according to the opinion of specialists -- in about 1995 in connection with the aggravation of energy and ecological problems. It is being proposed to "throw" on the market beautiful, rapid, economical and ecologically safe transportation using magnetic suspension by that time.

In order to keep in step with the advanced countries, it is necessary to accelerate the solution of technical and organizational problems in the building of this type of transport.

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